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PRESENTED
23 MAR 1934

PROCEEDINGS

OF THE

Bournemouth Natural Science Society

Vol. 2.

SESSION 1909-10.

BRITISH MUSEUM
NATURAL HISTORY

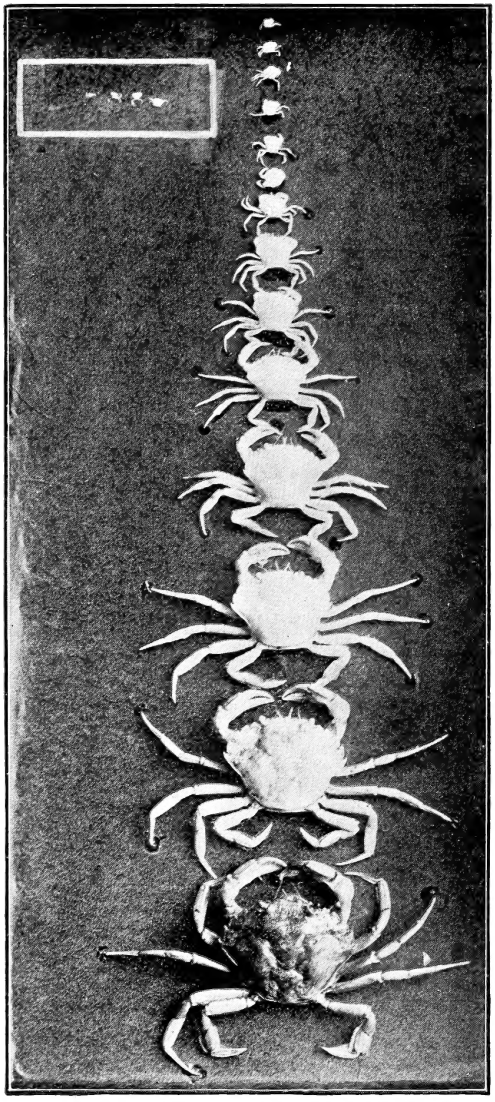

PLATE I.

Ecdyses of a Common Shore Crab over a period of three years. Reared by H. J. Waddington, Esq., F.L.S.

PROCEEDINGS OF THE

Bournemouth Natural Science Society.

- - VOL. 11 - -

SESSION 1909-10.

PUBLISHED BY THE SOCIETY AT THEIR ROOMS,

GRANVILLE CHAMBERS, BOURNEMOUTH, 1911.

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Introductory.

THE BOURNEMOUTH NATURAL SCIENCE SOCIETY was founded in 1903, being the successor to an older society which became defunct in 1897. Its objects are the promotion of Science in all its branches, by means of Lectures, Field Meetings, the Reading and Discussion of Papers, and the formation of Sections of its members devoted to any particular branch of the Society's work.

The Sections at present working are seven in number:— **Archæological and Historical, Botanical, Geographical, Geological, Microscopical and Zoological, Photographical,** and **Physical.**

During the WINTER SESSION, from October to April, two GENERAL MEETINGS are usually held in each month, comprising Lectures and Demonstrations on various subjects of scientific interest, illustrated by lantern slides, diagrams, or specimens. These meetings are held in Trinity Hall, Lorne Park, or in THE SOCIETY'S ROOMS, GRANVILLE CHAMBERS, RICHMOND HILL, on Saturdays, at 4.30 p.m.

The SECTIONAL MEETINGS are held at Granville Chambers on Thursdays and Saturdays, at 4.30 p.m., each Section being allotted one monthly meeting. At these, the papers read are more specialized and technical than at the General Lectures.

During the SUMMER SESSION, GENERAL EXCURSIONS to places of interest in the neighbourhood are arranged once in each month, usually on Wednesdays. SECTIONAL EXCURSIONS also take place, one in each week, on Wednesdays or Saturdays.

The management of the Society is vested in a Council, which is elected at the Annual General Meeting, held in October.

The Members are elected by the Council, and pay an annual subscription of Ten Shillings for full membership (admitting to all meetings and excursions for the year), or Seven Shillings and Sixpence in the case of those who do not desire to attend Sectional Meetings or Sectional Excursions. Visitors to Bournemouth are permitted to join for the Winter or Summer Sessions on payment of Five Shillings, if approved by the Council.

The Society is endeavouring to lay the foundation of a MUSEUM, by acquiring collections of archæological, botanical, geological, zoological, and other specimens of scientific interest, which are being arranged, and are open to the inspection of members, at Granville Chambers.

A MONTHLY NOTICE, giving full particulars of all meetings, etc., is posted to every member at the beginning of each month, and a Volume of Proceedings is published every year.

Application Forms for Membership, and further particulars, can be obtained from the Secretaries of the Society:—

H. LE JEUNE, ESQ.,
St. Ives,
Ashley Road,
Upper Parkstone
(Hon. Secretary).

Mr. J. F. SPENCER,
Glenthorne,
Richmond Park Road,
Bournemouth
(Assistant Secretary).

March, 1911.

Bournemouth Natural Science Society.

OFFICERS AND COUNCIL FOR 1910-11.

President:

DR. DUKINFIELD H. SCOTT, M.A., LL.D., F.R.S., F.G.S.
President of the Linnæan Society.

Vice-Presidents:

G. BROWNEN, ESQ., F.C.S.
DR. G. E. CRALLAN, M.A., M.B., M.R.C.S.
J. E. LIDDIARD, ESQ., F.R.G.S.
M.N.G.S. of U.S.A., M.J.S.
THE REV. E. F. LINTON, M.A.
DR. A. RANSOME, M.A., F.R.S.
MISS C. AGNES ROOPER.
DR. A. W. THOMAS.
DR. J. ROBERTS THOMSON, J.P.
H. J. WADDINGTON, ESQ., F.L.S.
C. J. HANKINSON, ESQ., J.P.

Chairman of Council:

DR. WILLIAM T. ORD, F.G.S.

Chairmen of Sections:

Archæological and Historical: G. BROWNEN, ESQ., F.C.S.
Botanical: MISS C. AGNES ROOPER.
Geographical: G. DE CASTRO, ESQ., M.R.C.S. ENG.
Geological: DR. W. T. ORD, F.G.S.
Microscopical and Zoological: DR. A. W. THOMAS AND H. B. WELLS, ESQ.
Photographical: E. W. BARLOW, ESQ., F.R.A.S.
Physical: HUBERT PAINTER, ESQ., B.SC., F.C.S.

Council:

THE OFFICERS (ex-officio) and
H. BACKHOUSE, ESQ.
S. WHITTY CHANDLER, ESQ., B.A.
J. H. SCOTT, ESQ., M.E.
R. V. SHERRING, ESQ., F.L.S.
SIR DANIEL MORRIS, K.C.M.G., M.A., F.L.S.
J. M. FRENCH, ESQ.
G. G. HAMILTON, ESQ., M.B., F.R.C.S. ENG.
T. MICHELL, ESQ.

Secretaries:

Hon. Secretary: H. LE JEUNE, ESQ., St. Ives, Ashley Road, Upper Parkstone.
Assistant Secretary: MR. J. F. SPENCER, Glenthorne, Richmond Park Road, Bournemouth.

Hon. Treasurer:

G. BRUMELL, ESQ., A.R.I.B.A.

Hon. Librarian:

F. J. COOKE, ESQ.

Hon. Auditors:

H. SUTTON, ESQ.
E. BICKER, ESQ.

Bankers:

NATIONAL PROVINCIAL BANK OF ENGLAND, BOURNEMOUTH.

PAST PRESIDENTS.

1903-4	J. E. BEALE, ESQ., Mayor of Bournemouth.
1904-5—1905-6	G. E. J. CRALLAN, ESQ., M.A., M.B.
1906-7	H. J. WADDINGTON, ESQ., F.L.S.
1907-8—1908-9	DR. A. RANSOME, F.R.S.
1909-10	DR. A SMITH-WOODWARD, LL.D., F.R.S., F.L.S., F.G.S.

Annual Meeting, 1909.

THE ANNUAL MEETING for 1909 was held in the Society's Rooms, Granville Chambers, Richmond Hill, on October 30th, at 4.30 p.m. The chair was taken by Dr. W. T. Ord.

The Minutes of the previous Annual Meeting held on October 31st, 1908, and of the Special General Meeting held on December 12th, 1908, were read and confirmed.

The Committee's Report for the past year was read and adopted.

The Hon. Treasurer presented his Statement of Accounts and Balance Sheet, showing a balance in hand of £20 9s. 7d. The Balance Sheet was accepted and a vote of thanks was passed to the Hon. Treasurer for his excellent services.

The Reports of the Chairmen of Sections were presented—details of which appear in the 1st vol. of "Proceedings."

Dr. A. Smith Woodward, LL.D., F.R.S., F.L.S., F.G.S., Keeper of the Geological Department of the British Museum, was proposed as the President of the Society for the ensuing year and elected unanimously.

The previous Officers and Committee were re-elected *en bloc*, with the addition of S. Whitty Chandler, Esq., B.A., to a vacant place on the Committee.

An alteration of Rule 17 was made—the word "financial" omitted and the following added:—"except by desire of the members present at the Annual Meeting"; and the following addition to Rule 8 was also made—"Visitors for the summer may be permitted to join the excursions of the Society at the same charge" to be inserted after the word "Sub-Committee."

Receipts and Payments Account for year ending 30th September, 1910.

Dr. **RECEIPTS.**

	£	s.	d.
Balance from last year	20	9	7
Members' Subscriptions	114	15	6
Subscriptions in advance for 1911	5	17	6
Life Members' Subscription	5	5	0
Proceeds from Lectures	15	14	0
Sale of "Proceedings"	1	11	0
Contributions for Subscription to the Palæontographical Society	1	1	0
Mr. Brownen, for cost of Wood Block ...	0	4	9
Dr. Crallan, for Book on Eocene Fossils ...	0	15	0
Refunded by Students' Association for last year	0	7	6
,, ,, ,, ,, for current year	2	14	6
Sundry Receipts	3	4	6
	£171	19	10

PAYMENTS. *Cr.*

	£	s.	d.
Rent of Granville Chambers	24	5	0
Rent of Trinity Hall	5	0	0
Caretaker's Wages	2	12	0
Cost of 1st vol. of "Proceedings" ...	24	15	0
Other Printing and Stationery	16	6	6
Furniture and similar expenses	2	17	3
Postage	9	8	3
Lantern Expenses	2	5	6
Subscription to Palæontographical Society ..	1	1	0
Lecturers' Fees and Expenses	6	16	0
Library—Books and other Expenses ...	2	18	10
Paid out for Students' Association ...	2	14	6
Sundries	2	8	4
	£103	8	2
Balance at Bank ...	68	11	8
	£171	19	10

We have examined the foregoing Account with the Vouchers for Receipts and Payments and have found the same correct.

21st October, 1910.

EDWARD BICKER
HERBERT SUTTON } *Auditors.*

Committee's Report
for the year ending Sept. 30th, 1910.

In presenting the Seventh Annual Report, the Committee feel great pleasure in being able to record a further increase in the membership and a continuance of the activity and prosperity which have marked the footsteps of the Society since its commencement in November, 1903.

The membership has increased to 284.

During the Winter Session, nine General Lectures were delivered, and 35 Sectional Meetings held. The General Lectures were as follows :—

1909.

*Nov. 13th.—"The Palace of Pharaoh-Hophra, and other finds in Egypt during the Season 1908-9," by G. A. Wainwright, Esq., of the British School of Archæology in Egypt (one of Professor Flinders Petrie's assistants).

*Nov. 20th.—Presidential Address by the newly-elected President, Dr. A. Smith-Woodward, LL.D., F.R.S., F.L.S., F.G.S., Curator of the Geological Department of the British Museum, entitled :—"The Mammalian Life of the Eocene Period."

*Dec. 11th.—"My Experiences of New Guinea and its Wild Savages," by James E. Liddiard, Esq., F.R.G.S.

1910.

Jan. 15th.—"How to know the Wild Flowers" (illustrated by diagrams and figures, and by fresh and dried specimens), by J. F. Rayner, Esq., MEM. BRIT. MYC. SOC., of Southampton.

*Jan. 29th.—"The Growth of the English Language," by Samuel Wood, Esq., F.C.A.

*Feb. 12th.—"The Hardy Country, or the Witchery of Wessex," by Harry Pouncy, Esq., Asst. Sec. of the Dorset Field Club.

*Feb. 26th —"Temples and Life in South India," by C. Lyon, Esq.

*March 12th.—"The Chemical Analysis of Solutions," illustrated by numerous experiments shown by the lantern, by Hubert Painter, Esq., B. SC., F.C.S.

*April 9th —"The Blossoming of the Trees," by Miss Ida M. Roper, F.L.S., of Bristol.

* Lantern Lectures.

Details of the Sectional Meetings are given under the heads of the respective sections.

During the summer, eight General Excursions and fifteen Sectional Excursions took place. The lamented death of King Edward VII and the Bournemouth Centenary Fêtes disturbed the course of the earlier Summer Excursions and lessened their number. The General Excursions were as follows :—

May 25th.—Special visit to the British Museum, by the kind invitation of the President.

June 4th.—Lulworth Cove (in conjunction with the Bournemouth Students' Association), conducted by the Rev. E. C. Spicer, M.A., F.G.S.

June 15th.—Shepton Mallet, conducted by Dr. Ord and Mr. W. F. Barnes.

June 29th.—A tour through the New Forest, conducted by G. Brownen, Esq., F.C.S.

July 27th.—Winchester, conducted by N. C. H. Nisbett, Esq., A.R.I.B.A.

Aug. 17th.—Milton Abbas, conducted by the Rev. Herbert Pentin, M.A., F.S.A.

Sept. 7th.—Garden Party at "The Elms," Parkstone, by kind invitation of Dr. and Mrs. Crallan.

Sept. 14th.—East Lulworth, Arish Mell, Flowers Barrow and Wareham, conducted by Dr. Ord.

The past year has been a very eventful one. For the first time a president was sought for outside the body of the members of the Society. The Committee consider that a great honour has been conferred upon the Society by the acceptance of the presidency by Dr. A. Smith Woodward, LL.D., F.R.S., F.L.S., F.G.S., the Keeper of the Geological Department of the British Museum. They feel that this event has been very advantageous to the Society, that it has stimulated further activity, and that the Society has thereby gained in prestige.

Another event of importance has been the issuing of the 1st volume of "Proceedings" of the Society. This volume, which contains many original papers, has done much to improve the general status of the Society, and in view of this publication, the British Association has raised the Society from Association to Affiliation.

The financial position of the Society is very satisfactory (see the Hon. Treasurer's Statement and Balance Sheet), and the best thanks of the Society are due to the Hon. Treasurer (Mr. G. Brumell) for the able way in which financial matters have been dealt with during the past year.

Owing to very liberal gifts, and under the excellent direction of the Hon. Librarian (Mr. A. Scott), the Library has made great progress, and very satisfactory arrangements have been made for the loan of books. (The details will appear under the Hon. Librarian's Report.)

Among the more valuable presentations to the Society (other than books, which are mentioned in the Hon. Librarian's Report) may be mentioned a beautiful series of ecdyses of the harbour crab by H. J. Waddington, Esq., F.L.S; a large tropical star-fish and fine and unique specimen of coral by Dr. Crallan; several fine specimens of Argonauta Arga by Miss Sherring; fossils from Mupe Bay by R. V. Sherring, Esq., F.L.S.; a number of Eocene leaf remains from the Bournemouth Cliffs by Dr. Ord and H. Le Jeune, Esq.; a valuable collection of 160 rare plants by the Rev. E. F. Linton, M.A., and many others by R. V. Sherring, Esq., F.L.S.; and the skulls of a number of British mammals presented by T. B. Goodall, Esq., F.L.S., which he used to illustrate his paper on dentition. In view of the extensive additions to the Botanical Collection, it was decided to purchase a second botanical cabinet.

At a meeting held on June 20th, 1910, Mr. Sherring showed some specimens of the gladiolus illyricus (the wild gladiolus), which he had found in the Isle of Purbeck. With the exception of Ensbury, this is the first record for the County of Dorset.

During the year, the Society has been affiliated with the Geographical Association.

The Society has never been in a more flourishing condition than at present, and the Committee wish to express their best thanks to the various lecturers and conductors of excursions, who by assisting them with lectures and excursions during the past year, have contributed materially to this result. Their cordial thanks are also due to Dr. and Mrs. Crallan for their great kindness in inviting the members of the Society to a garden party at their residence, "The Elms," Parkstone, this proving a most attractive and enjoyable function.

Librarian's Report.

for 1909-10.

THE Library was started in January last and has made on the whole very satisfactory progress. It now numbers 300 vols.

The special thanks of the Committee are due to Dr. Crallan, whose liberality towards this department of the Society's work is beyond praise.

Donations of books have been received also from Miss C. A. Rooper, W. P. Curtis, Esq., R. V. Sherring, Esq., Dr. Dixon, Miss Rogers-Barns, Dr. Thomas, Dr. Mahood, J. E. Liddiard, Esq., S. W. Chandler, Esq., Dr. Colley March, H. Backhouse, Esq., A. Gray, Esq., F. B. Bond, Esq., Col. Markwick, G. Galpin, Esq., Thos. Shepheard, Esq., Horace G. Commin, Esq., Geo. Brownen, Esq., Geo. Brumell, Esq., and the Hon. Librarian.

The following kindred Societies having received copies of the first vol. of the Proceedings of the Society, have sent theirs in return and expressed a desire to continue the exchanges in future, viz:—The Chester Society of Natural Science; The Croydon Natural History and Scientific Society; The Bath Natural History and Antiquarian Field Club; The Cambridge Antiquarian Society; The Torquay Natural History Society and The Hampshire Field Club and Archæological Society.

The Committee desire to thank very warmly all the donors above mentioned, and to express the hope that by means of similar gifts the Library may soon be made a really valuable and indispensable aid to the Scientific work of the Society.

Grateful reference too, must be made to the valuable assistance rendered by H. le Jeune, Esq., in the reconstruction of the Library Cases, rendered necessary by the rapid increase in the number of volumes and also to A. Gray, Esq., for the lettering of a goodly number of labels in his own admirable way.

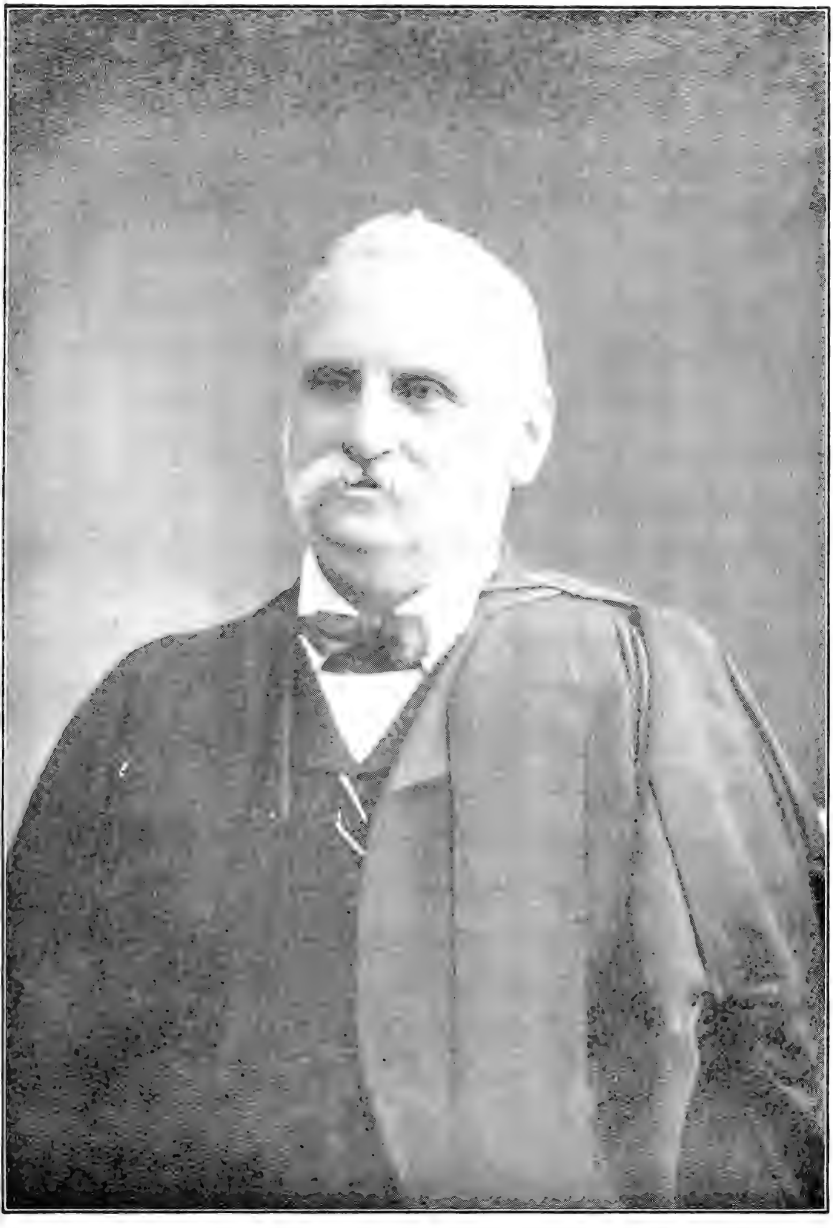
By a recent alteration in the Rules of the Library, increased facilities in the use of the books have been granted, and members will be able in future to take out and return volumes without the personal intervention of the Librarian at any time most convenient to themselves.

The late Mr. Alexander Scott, B.A.

"WE deeply regret to record the death of Mr. Scott, the Hon. Librarian of the Bournemouth Natural Science Society, which took place suddenly at his residence in Buchanan Avenue on Thursday, November 24th. His death occurred only a few days after he had seen his 70th birthday. His interment in the Bournemouth East Cemetery was on Monday last, and his remains were followed to the grave by most of the members of the Executive Council of the Bournemouth Natural Science Society, who feel the loss of an energetic colleague. Deceased may be styled the first Librarian of the Society, for the arrangement of their works of reference and record was not only conceived, but accomplished by him. We may add as another sad incident in connection with his death that at the recent annual selection of chairmen of sections Mr. Scott was appointed Chairman of the Geographical Section."—*Bournemouth Directory*.

"Mr. Scott belonged to one of the oldest South Shields families, and was a son of Mr. John Scott, the well-known marine artist of that town. Mr. Scott selected the teaching profession, and was trained for it at the Borough Road College, London, and was described as a distinguished certificated teacher. His first appointment was Wolverhampton, but a few years later his services were obtained by South Shields, his native town, and he became the first Headmaster of the then newly constituted School Board. In those days of the new Education Act (1870) the work of organisation, staffing and other details of the new department fell very largely upon Mr. Scott, its first Headmaster, and they were effectively carried out. His efforts being recognised by the Local Authorities, he was chosen for the newly erected higher grade Westoe Secondary School in 1902. It was then one of the three largest schools in the country. Under Mr. Scott's personal supervision and control as its Principal the school was recognised as effective, and we are glad to hear that it is still in a flourishing condition. As the Principal of the Shields School the deceased resolutely pursued his personal studies and matriculated, and subsequently obtained his B.A. degree at the London University. As a clever mathematician he was insistent upon it in others, and with great success. He also took an active and leading part in the work of the National Teachers' Union, of which he was local Chairman while in the North of England, and was one of the founders and most useful members of a Literary and Philanthropic Society in his native town, etc. A few years since, as a retired teacher, he came to live at Bournemouth, and he brought with him not only his literary abilities, which were of a high order, but his tact and attention to details, which were not only at the service of Societies and Libraries, but also helpful to individual reserch. Bournemouth residents have good reason to regret the loss of so active and capable a townsman."—Reprint, *South Shields Press*.

The funeral was attended by a number of members of the Council and the Society, who also presented a wreath of flowers.



The late ALEXANDER SCOTT, Esq., B.A.

(Late Hon. Librarian of the Bournemouth Natural Science Society).

BRITISH MUSEUM
NATURAL HISTORY

List of Members.

(CORRECTED TO JANUARY, 1911.)

* Honorary Members. † Past President.

A

Alder, Mrs.	East Grove, Lymington
Alder, Miss Evelyn	" "
Aldridge, Mrs.	Denewood, Alum Chine Road
Allday, J. L.	Priory Lodge, Alumhurst Road
Allday, Mrs.	" "
Allis-Smith, Miss E.	Martello Towers, Branksome Park
Anthony, H.	Crossways, Burtley Road, Southbourne, Christchurch
Archer, J. W.	Windlesham, Braidley Road
Archer, Mrs.	" "
Aston, J. J.	Habberley, Hamilton Road
Atkins, Dr. F.	Cathay, Alumhurst Road
Atkins, Mrs.	" "
Atkinson, Miss	Berwyn, Hamilton Road

B

Backhouse, H.	Yelland, McKinley Road
Backhouse, Mrs.	" "
Bain, Mrs.	Sea Cliff View, Sea Road, Boscombe
Bainbridge, Surgeon-General	Eridge, Branksome Wood Road
Banks, Ald. R. Y.	Egerton, Portchester Road
Barlow, E. W., F.R.A.S.	Ditton Lodge, Stourwood
Barnard, Henry de Crez	Hobart Lodge, Shaftesbury Road
Barrett, J. Hayes	The Nook, Dalkeith Steps
Bartlett, H. F. D.	1, Myrtle Road, Richmond Park
Batley, Dr.	8, High Street, Christchurch
Beck, Richard	Red Lodge, Portchester Road
Beck, Mrs.	" "
Beck, Miss M.	" "
Beck, Miss S.	" "
Bell, Miss R.	Clonmarron, Christchurch
Bell, Miss F. C.	" "
Bell, T. G., M.D.	Poole Road, Branksome
Benison, F.	Aldborough House, Rosemount Road
Benison, Mrs.	" "
Bennett, H. Morden	Manor Lodge, Manor Road
Bennett, Miss E. C.	Bonavista, Boscombe Spa Road
Bennett, G.	Sigwells, 20, Belle Vue Road
Bennett, Mrs.	" "
Beynon, Mrs,	Rosslyn, Crescent Road
Beynon, Miss	" "
Beynon, Rev. S.	" "
Blackett, C. H.	Rosapenna, McKinley Road
Blackett, W. Eggleston	Blanchland, McKinley Road
Blosse, Rev. R. C. Lynch	Hawthorn Dene, Cavendish Road
*Bond, F. Bligh, F.R.I.B.A.	Glastonbury, Somerset
Boxer, Miss Violet	Firwood, Alum Chine

Braden, Miss	Knole Lodge, Knyveton Road
Brazier, J. J.	East Hill, Southcote Road
Bridger, Commd'r N. L., R.N.	Walton Leigh, Tower Rd., Branksome Park
Broughton, Miss	Chatsfield House, Boscombe Spa Road
Brownen, G., F.C.S.	Talnas, Grove Road, Christchurch
Brownen, Mrs.	,, ,,
Brumell, G., A.R.I.B.A.	Maori, Richmond Park Avenue
Brumell, Mrs. G.	,, ,,
Bulfin, Ignatius, B.A.	The Den, Knole Road
Bulfin, Mrs.	,, ,,
Buckler, Wm.	60, West Cliff Road
Buckler, Mrs.	,, ,,

C

Cameron, Miss	Little Forest House
Casswell, Miss W.	27, Suffolk Road
Cavit, C. G.	Marly, Argyle Road, Boscombe
Chaffey, J.	294, Wyndham Road
Chambers, D.	41, Seabourne Road, West Southbourne
Chandler, S. Whitty, B.A.	St. George's, Cecil Road, Boscombe
Chandler, Mrs. Whitty	,, ,,
Chapman, F. F.	Penrhyn, Argyle Road, Boscombe
Chapman, Miss	,, ,,
Chidell, Miss	Nairn, Suffolk Road
Chittenden, H.	Pinemore, 127, Richmond Park Road
Clements, Lieut.-Col. W. G., R.A.M.C.	The Hermitage, Southbourne
Cliffe, Miss	c/o W. Hughes, Esq.
Coddington, E. F.	St. Frideswide, Southbourne Road
Colclough, J. E. H.	Bellagio, Pembroke Road
Coles, Dr. A. C.	York House, Poole Road
Commin, H. G.	100, Old Christchurch Road
Cooke, F. I.	Kingsdown, Charminster Road
Cooper, The Rev. Windle, M.A., F.R.G.S.	Bergen, Branksome Wood Road
Cooper, Mrs. J. Omer	Calcot, Westby Road, Boscombe
Cooper, J. Omer	,, ,,
Cooper, Wilfrid Omer	,, ,,
Cooper-Dean, Mrs.	The Old Vicarage, Pokesdown
Cowie, Dr.	Bonaccord, Westminster Road, Branksome Park
†Crallan, Dr. G. E. J., M.A., M.B.	The Elms, Parkstone
Crallan, Mrs, M.R.C.S.	,, ,,
Crespi, Dr.	Wimborne
Cundy, Mrs.	Shelley Grove, Boscombe
Curtis, W. Parkinson, F.E.S.	Square, Bournemouth
Curtis, Mrs. H. E.	Chineham, St. Valerie Road
Curtis, Miss F. K.	,, ,,
Curtis, Miss E. M.	,, ,,

D

Dacombe, J. M. J.	27, Holdenhurst Road
Davenport, Miss C.	St. Clement's Vicarage
de Castro, G., M.R.C.S. ENG.	Sunnydene, Drummond Road
de Castro, Mrs.	,, ,,
de Paiva, R. A.	San Remo, Carysfort Road
de Paiva, Mrs.	,, ,,
Dibben, Miss M.	c/o Mrs. Jeremy
*Dixon, Dr. J. R. L.	Torbay House, Torbay Road, Paignton

Dodd, Dr.	Maybrook, Wimborne
Dodshon, Edwin	Lloyd's Bank Chambers
Donkin, J., F.R.I.B.A.	Maywood, Christchurch Road
Donkin, Mrs.	,, ,,
Druitt, J.	Avebury, Madeira Road
Duka, Dr. A., D S.O.	15, Grand Avenue, West Southbourne
Dunning Mrs.	The Homestead, St. Clement's Road

E

Earle, Dr.	York House, Forest Road, Branksome Park
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Foster, Miss Amy	,, ,,
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Fowler, Miss R. M.	,, ,,
Fowler, Miss V. M.	,, ,,
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Frean, Mrs.	,, ,,
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G

Galpin, G.	Clarendon Court, Clarendon Road
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Graham, F. A.	21, Beaulieu Road
Grange, Dr. W. D'Oyley	11, McKinley Road
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Grindley, Miss E. J.	Chatfield, Parkstone, Dorset
Guest, G.	St. Paul's School
Guy, Miss	,, ,,

H

Hall, J. T.	Highmoor, Ipswich Road
Hall, Maxwell	,, ,,
Hamilton, G. G.	Boscombe Place, Boscombe
Hamilton, Mrs.	,, ,,
Handley, Rev. S. B,	Copthorne, Winton
Hankinson, C. J., J.P.	Eastbury, Surrey Road
Harding, Miss	Alma Road Council School
Hawker, Miss	Kingsbere, Meyrick Park Crescent

Hayllar, J., J.P.	Redholme, Cambridge Road
Hayllar, Miss	,, ,,
Heaton, Guy, M.A.	St. David's, West Cliff Road
Hennesey, J. E., B.SC.	Guildhill Road, Southbourne, Christchurch
Heywood, Col. J. M.	Sutherland Hall, South Cliff
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Hinton, Miss	Welcombe, Argyle Road
Hollins, J. C.	Mitford, Pembroke Road
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Holmes, Mrs.	,, ,, [Southbourne
Hovenden, F., F.L.S., F.G.S.	Glenlea, Thornton Park Road, West Dulwich, S.E.
Hughes, D.	Meran, Wellington Road
Hughes, W.	Beaufort, Hengist Road
Hughes, Miss	,, ,,
Hughes, Miss M.	,, ,,
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I

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J

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Jeremy, Dr. Mary	4, Richmond Hill
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Jones, W.	Council School, Boscombe

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Kaye, J. E.	Tynedale, Portchester Road
Killick, Miss T. L. B.	c/o Dr. Crallan

L

Langley-Smith, W.	Alumhurst Tower, Alumhurst Road
Langley-Smith, Miss	,, ,,
Langley-Smith, Miss R.	,, ,,
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Lattey, Mrs.	,, ,,
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Lilley, Mrs.	,, ,,
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Lucas, Arthur	Croftmoor, Dean Park Road
Lucas, Arthur, Junr.	Highfield, Richmond Park Avenue
Lupton, Miss	Bollingbroke, Knole Road
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M

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Michell, T.	Trewirgie, Wellington Road
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Morris, Lady	,, ,,
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Neale, Mrs.	,, ,,
Neale, Miss D.	,, ,,
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O

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Ord, Mrs.	,, ,,
Ord, Miss	,, ,,
Oswald, The Rev. H. M., M.A.	Eaglehurst, Bodorgan Road

P

Page, The Rev. E.	The Birks, Branksome Wood Road
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Page, Mrs.	,, ,,
Page, Miss P.	,, ,,
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Painter, Mrs.	,, ,,
Parish, Miss	Bentley Lodge, Hengist Road
Parmiter, P. J.	Milton House, St. Leonard's Road
Parmiter, C. J.	,, ,,
Pate, The Rev. J.	Spencer House, Constitution Hill, Parkstone
Pearce, Miss	Kempstone, Chine Crescent
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Pechell, Miss	,, ,,
Peters, Miss A. F.	Bilton, Pembroke Road
Peters, C. J.	Chilgrove, Hythe, Southampton
Peters, Miss S. A.	,, ,,
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Price, Miss	The Mount, Branksome Wood Road

Q

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Ransome, Miss	,, ,,
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Robertson, Mrs.	,, ,,
*Rogers, The Rev. Moyle	Chetnole, Grosvenor Road
Rogers-Barns, Miss	Bevois Cottage, King's Park Road
Rooper, Miss C. Agnes	Pen Selwood, Gervis Road
Ross, Col. W. H.	Ambleside, Dean Park Road
Rudkin, Miss F.	Ivel Cottage, Hamilton Road, Boscombe
Rutherford, C. R.	South Dene, Groveley Road
Rutter, G. H , M.B.	Roxbury House, Poole Road
Rutter, Mrs.	,, ,,

S

Sandell, J. W.	Wilts and Dorset Bank, Boscombe
Saunders, Hugh A., B.A., F.R.G.S.	Brookfield House, Swanage
Scattergood, J.	Alma Road Council School
Scott, J. H., M.E., M.I.M.C.E.	Ardrossan, Sedgley Road, Winton
Scott, W. H., M.A.	Hendall, Westminster Road, Branksome
Scott, Miss M.	,, ,, [Park
Sedgfield, Miss C. B.	Hartmoor, Alumdale Road
Serpell, E. Wilson	Loughtonhurst, West Cliff
Sherring, R. V., F.L.S.	Kildare, Norwich Avenue
Sherring, Miss	,, ,,
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Slade, Mrs. J. Hayter	Whinthorpe, Parkstone
Slade, Miss Doris	,, ,,
Slade, Miss Margery	,, ,,
Slade, Miss Joan	,, ,,
Southby, Miss E. H.	Twyford Lodge, Cavendish Road
Spencer, J. F.	Glenthorne, Richmond Park Road
Spriggs, A. T.	The Bryn, Belle Vue Road, Southbourne,
Spriggs, Mrs.	,, ,, [Christchurch
Stevens, T., F.R.I.B.A.	Richmond Chambers
Stevenson, E. A.	Northwood, Windermere Road
Stokes, R.	Laverstock, Cliff Road, Boscombe
Strachan, Mrs.	Burley, Tregonwell Road
Sulivan, Gerald H., B.SC.	The Old Ride, Branksome Park
Sutton, H.	Ravenshall, Chine Crescent Road
Sutton, Mrs.	,, ,,
Sutton, K. H. M.	,, ,,
Sutton, Miss C. E. M.	,, ,,
Swallow, E.	Westridge, Sandbanks, Parkstone
Sworn, Mrs.	Normandale, Lansdowne Road

T

Tallant, Miss A.	Gablehurst, Kingsbridge Road, Parkstone
Thomas, Dr. A. W.	Carmelita, Crabton Close Road, Boscombe
Thompson, The Rev. G., M.A.	Highbury, Bodorgan Road
Thomson, Dr. J. Roberts, J.P.	Monkchester, Manor Road
Thompson, C. R.	Holmwood, Castle Hill, Parkstone, Dorset
Thompson, Miss Alice	,, ,,
Thompson, Miss A. C.	,, ,,
Thompson, Miss Ellen	,, ,,
Towle, The Rev. W. Harrison	Collett House, Drummond Road
Trapnell, A.	Great Chalfield, Wollstonecraft Road
Trapnell, Mrs.	,, ,,
Tyler, Miss E. V.	Caldicote, Alexandra Road, Parkstone
Tyler, Miss G.	,, ,,

V

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Veale, Miss L. H.	Pengelly House, Beaulieu Road
Veale, Miss C.	,, ,,
Veale, Miss M. C.	,, ,,
Veale, Miss A. G.	,, ,,
Vipan, Miss Dora	St. Michael's Vicarage

W

†Waddington, H. J., F.L.S.	Moreton, Lowther Road
*Wallace, Dr. Alfred Russel, O.M.	Broadstone, Dorset
Warr, Miss Ada	Cottesmore, Pokesdown Hill
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Waters, Mrs.	,, ,,
Watson, J. J.	Golftyn, Parkstone Avenue, Parkstone
Webster, The Rev. T.	Devonia, Chatsworth Road
Welby, The Rev. A.	Englefield, Groveley Road, West Bournemouth
Wells, H. B.	Stalham, Studland Road
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Wood, Miss S. J.	,, ,,
Woodhouse, W. J., A.C.P.	Mayhill, Chatsworth Road
Woollacott, J. Christopher	Solent View, Belle Vue Road, Southbourne
Wright, The Rev. T. Russell	Mountside, Westbourne Park Road
Wright, Mrs. A. L.	Spelsbury, Warren Edge Road, Southbourne, Christchurch

Y

Yates, R. P.	Wood Manton, Wellington Road
Yates, T. A.	,, ,,
Yates, Miss Ione	,, ,,
Yates, Miss Isabel	,, ,,

RULES OF THE

Bournemouth Natural Science Society.

Amended to 29th October, 1910.

Title

1.—The title of the Society shall be THE BOURNEMOUTH NATURAL SCIENCE SOCIETY.

Objects

2.—The objects of the Society shall be the promotion of the study of Science in all its branches, by means of Lectures, Field Meetings, the Reading and Discussion of Papers, and the formation of Sections of its members devoted to any particular branch of the Society's work, or by any other means that the governing body of the Society shall deem advisable.

3.—The Society shall encourage the making of reports on any plant, animal, or object of interest, and where the Society may deem it necessary, take such steps as may be advised to secure any such plant, animal, or object of interest from injury, extinction or destruction.

Members

4.—The Society shall consist of Ordinary, Life, Associate, and Honorary Members.

5.—The Ordinary, Life, and Associate Members of the Society shall be proposed by an existing Member, and seconded by another existing Member, and notice shall be sent to one of the Secretaries of the Society of the names and address of the nominee, and the names of the proposer and seconder. Any such proposed new Member shall be voted for at the next ensuing Council Meeting, and if two-thirds of the Council present and voting shall vote for the proposed new member, such candidate shall become a Member upon payment of the Annual Subscription, and shall receive a card of membership (not transferable) entitling him or her to attend the Meetings of the Society. Members joining during the last two months of the Summer Session shall be given a card of membership to September 30th, of the following year.

Ordinary Members

6.—Ordinary Members shall pay an Annual Subscription of Seven Shillings and Sixpence, due on the first day of October in each year. An additional Sectional Subscription of Two Shillings and Sixpence is charged to cover admission to the Meetings and Excursions of the Sections. The Annual Subscription for Adult members of the same family, not exceeding four, and residing in the same house shall be Fifteen Shillings, each Member being elected in the usual manner, and each receiving a Card of Membership.

Life Members

The Subscription for Life Members shall be Five Guineas. Any Ordinary Member who shall have commuted his Subscription, as provided for in this Rule, shall become a Life Member, but shall not by reason thereof have any different rights from those of an Ordinary Member.

Associate Members

7.—Associate Members are those who by payment of an Annual Subscription of Two Shillings and Sixpence are entitled to attend all the Ordinary Meetings and Excursions of the Society. They also have the privilege of joining any one particular Section they may select at the time of their election, or at the commencement of each Session, their choice

being notified by them to the Hon. Treasurer. The following are entitled to become Associate Members, on election by the Council :—

(*a*) Teachers in schools who are still engaged in the active duties of their profession.

(*b*) Persons who in the opinion of the Council, although unable to pay the fee for full membership, are by their acknowledged scientific tastes or attainments, likely to prove useful working Members of the Society.

On further payment of the usual Sectional Subscription of Two Shillings and Sixpence, Associate Members may join all the Sections. Associate Members shall have no power of voting on the affairs of the Society, or of holding office.

Visitors

8.—Any Visitors introduced by a Member or producing a Member's card, may be admitted to any Lecture of the Society on entering their names and that of the introducing Member in the Society's Visitors' Book. Such privilege not to be acceded more than twice to any one person in each Session.

On the recommendation of the Standing Sub-Committee, Visitors to Bournemouth desirous of attending the Meetings of the Society may obtain a ticket of admission for the winter at a charge of Five Shillings. Visitors for the summer may be permitted to join the Excursions of the Society at the same charge. Applications to be made to the Hon. Treasurer.

Honorary Members

9.—Honorary Members shall consist of any distinguished men of Science, or any persons who may render any special service to the Society. Such Honorary Members shall be proposed and elected in the same way as Ordinary Members.

10.—Any Members whose subscriptions are unpaid at the end of the financial year (September 30th), on notice to that effect in writing having been given to them by the Hon. Treasurer, shall be reported to the Council who shall have the power of removing their names from the list of Members.

11.—Resignations should be in writing, and addressed to one of the Secretaries, and until such are received by them, Members remain liable for their subscriptions.

12.—The power of expulsion of a Member from the Society for objectionable conduct shall be vested in a General Meeting of the Society, provided the Council has caused special notice to be given on the circular convening the Meeting, and that two-thirds of those present and voting agree thereto.

Officers

13.—The Officers of the Society shall consist of two or more Vice-Presidents, the Chairmen of Sections, an Honorary Treasurer, an Honorary Librarian, an Honorary Secretary, and one or more Assistant Secretaries.

14.—There shall be a Council of the Society, consisting of the Officers and eight Members, who shall be elected at the Annual General Meeting. The Council shall have the general management of the Society. At all Meetings of the Council, five shall form a quorum. The Council shall elect their own Chairman for the year, and shall have power to fill up any vacancies in their number which may occur from time to time. The Council shall have power to appoint Committees to deal with any business that may be delegated to them. The Chairman at all Meetings of the Council shall have an original and a casting vote.

15.—The Council shall arrange for all Lectures, Papers, Demonstrations, and Exhibitions of Specimens, etc., at the Ordinary Meetings of the Society, and shall decide upon all general Field Meetings and Excursions. They shall have power to form any Section or Sub-section, to consist of not less than six members, for the study of any special subject which the Council may deem within the scope of the Society's work. They shall also have power to appoint the Chairman of any such Section or Sub-section.

16.—The Council shall have the control of the funds of the Society.

17.—Any Member of the Council other than Ex-officio Members, who shall have failed to attend half the number of Meetings of the Council in any one year, provided that such non-attendance be not caused by illness or absence abroad, shall not be eligible for re-election, except by desire of the Members present at the Annual Meeting.

The President

18.—The President need not necessarily be selected from Members of the Society, and shall be elected annually. He shall deliver an Address at as early a date in the Winter Session as can be arranged.

Vice-Presidents

19.—Any Member of the Society who, in the opinion of the Council, shall have rendered distinguished service to Science or to the Society, shall be eligible for election as a Vice-President.

20.—Each of the Vice-Presidents in rotation shall be requested to act as Chairman at the Ordinary Meetings of the Society.

Sectional Meetings

21.—The Chairmen of any Sections or Sub-sections appointed by the Council under Rule 15, shall form a Committee to arrange for the Sectional Meetings and Excursions, and shall meet for this purpose at least twice in each year. Each Sectional Chairman shall be responsible for the issuing of Notices of Meetings and Excursions to the Members of his Section, and shall submit accounts of costs incurred by him to the Hon. Treasurer, after each Meeting or Excursion, who shall lay the same before the Council at their next ensuing Meeting.

22.—A book for each Section shall be provided by the Secretaries to be kept at the Society's Room, each Chairman of Section to enter therein an account of each Meeting, with number of Members attending, and notes of any matters of interest observed or discussed. Such book to be presented at each Meeting of the Council. Every Chairman of Section shall report as to the work of his Section at the Annual Meeting of the Society.

Secretaries

23.—The Secretaries shall perform all the usual secretarial work; shall keep minutes of all Council Meetings, and the Annual General Meeting, and a synopsis of all Ordinary Meetings. They shall cause a programme of each Ordinary Meeting to be sent to every Member seven days at least before each such Meeting. They shall make all preparations for carrying out all Ordinary Meetings and General Excursions, at which they shall receive from each Member his or her share of the day's expenses, and therefrom defray all costs of the Meeting. Any surplus of such collection shall go to the General Fund, and any deficit be defrayed out of that fund. They shall keep an account of all out-of-pocket expenses incurred in arranging Meetings and otherwise. They shall give notice fo their election to all new Members. They shall furnish a copy of the Annual Report to all Members who have paid their subscription, to Honorary Members, and to any such Scientific Societies as the Council may from time to time appoint to receive them.

Treasurer

24.—The Honorary Treasurer shall have the custody of the General Funds of the Society. He shall prepare a Financial Statement at the end of each Financial Year to be presented to the Council at the Meeting next

preceding the Annual General Meeting. He shall receive and acknowledge all Subscriptions, and shall issue tickets of Membership to all persons who are duly elected and have paid their Subscriptions. He shall, when possible, attend Field Meetings and assist the Secretaries. He shall bring before the Council any accounts that are due for payment. After presentation of the Balance Sheet to the Council, he shall submit it to the Auditors, and lastly to the Annual General Meeting of the Society.

25.—At the Annual General Meeting and at all Ordinary Meetings of the Society, not less than ten Members shall form a quorum.

26.—At the Annual General Meeting, which shall be held in the month of October, the President, Officers, and Council of the Society, and two Auditors, for the ensuing year shall be elected (either Auditor having the power to audit the accounts in the unavoidable absence of the other). At this Meeting the Council's Report of the past year, together with those of the Chairmen of Sections, and the Hon. Treasurer's statement of accounts, duly signed by the Auditors, shall be submitted.

27.—Alterations in the Rules shall be sanctioned by a majority of not less than two-thirds of the Members present and voting at the Annual Meeting, or at a Special Meeting called for that purpose, and no alterations shall otherwise be made.

28.—Notice convening an Annual or Special General Meeting, together with any proposed alterations in the Rules, shall be given to Members at least seven clear days before such Meeting be held. The notice of Ordinary Meetings, and Council Meetings if possible, shall be at least seven clear days.

29.- On a written requisition, signed by at least five Members of the Society, the Council shall call a Special General Meeting to consider any question as to the affairs of the Society; such Meeting to be called within three weeks of the receipt of the requisition, and at least seven days' notice shall be given to the Members. At such Meeting no other business than that mentioned on the requisition, and on the notice convening such Meeting, shall be considered.

Presidential Address.

The Mammalian Life of the Eocene Period.

By A. Smith Woodward, LL.D., F.R.S., V.P.Z.S.

(*Abstract of the Presidential Address delivered 20th November, 1909.*)

The fossil backboned animals found in the Eocene and Oligocene deposits of the Hampshire Basin are of general interest from several points of view. In the first place, they agree with the plant-remains from the pipe-clays of the Bournemouth cliffs in showing that the climate of this region during the Eocene period was tropical or sub-tropical. Secondly, like the plants, many of them represent forms of life which have survived until the present day only in North America and the warmer parts of South America. Among these may be mentioned the gar-pikes (*Lepidosteus*), bow-fins (*Amia*), true alligators, and opossums. Thirdly, they are still more interesting as affording a glimpse of the warm-blooded quadrupeds (mammals) at the time when they first began to flourish and multiply, and when they were just showing signs of development into the several distinct groups or "orders" which characterise the existing world. At the end of the Cretaceous period, for some mysterious reason, the great land-reptiles, sea-reptiles, and flying-reptiles disappeared in every part of the globe. During the succeeding Eocene period the warm-blooded mammals and birds quickly spread and took their place.

This sudden appearance of the warm-blooded back-boned animals in great numbers at the beginning of the Eocene period both in Europe and in the New World is difficult to understand, because the region in which their ancestors lived has not yet been determined. There is reason to suppose that so far back as Triassic times, when reptiles were just beginning to flourish, a few back-boned animals actually reached the warm-blooded grade, and might indeed be described as mammals and birds. Most of the Triassic reptiles show a much closer approach to one or other of these two higher groups than any which have existed since. It is not yet known, however, to which area of land these fore-runners of the widespread Eocene groups were restricted. It is merely demonstrated by a few little creatures of the size of rats, which occasionally escaped over the sea (perhaps in floating wood), that during the Jurassic and Cretaceous periods, true mammals were living somewhere. The jaws and limb-bones of some of these escapes are found in the Purbeck Beds of Swanage, and teeth occur in the Wealden of Sussex.

It is probable that most of these early mammals until the Eocene period lived in trees, like the birds. In fact, some of them whose remains occur in the Hordwell cliffs (*Adapis*), are essentially

identical with the tree-dwelling lemurs which still survive in great variety in Madagascar and are also found in the forests of Africa and Southern Asia. These lemurs may be described as monkeys with inferior brains. It is generally supposed that some of the Eocene forms became "improved" into monkeys, which appeared in Miocene times. The apes and man followed later; and if popular surmises as to the origin of the human animal ever prove true, we may anticipate the demonstration that he comes from a long line of ancestors which developed their faculties and perfected their wonderful limbs while hunting for a mixed diet in the thick forest, and did not come down to compete with ordinary land-mammals until the latest times.

The earliest Eocene mammals which began to live on the ground, probably chiefly in swamps and on the banks of rivers, are best known by nearly complete skeletons from North America. Fragments from Western Europe are enough to show that similar animals lived here. They are all small, many of them not larger than cats, with a complete set of teeth fitted for cropping and crushing succulent food. Their brain is of as low a type as that of the pouched mammals of Australia—much lower and smaller than the brain of a modern cat or pig. Their tail is always long, and it is very thick at the root, thus resembling the tail as shaped in a reptile. Their feet at first are always five-toed, and the bones of the forearm are adapted for an easy twisting motion.

In some of the primitive mammals just described (*Condylarthra*) the teeth are comparatively blunt and the toe-nails are almost hoof-shaped, indicating a herbivorous nature. In others (*Creodonta*) the teeth are more pointed and compressed, while the toes are sharp, evidently marks of adaptation to flesh-feeding. In the Middle and Upper Eocene and Oligocene mammals, of which remains occur in the Hampshire basin, these divergences have progressed further, and the beginnings both of typical hoofed animals (*Ungulata*) and typical flesh-eaters (*Carnivora*) are evident. Cuvier restored some of these animals a century ago from specimens discovered in the Paris gypsum, but most of our knowledge of them now depends on the study of nearly complete skeletons found in corresponding geological formations in North America.

As observed by Cuvier, the nearest surviving relative of some of the Upper Eocene hoofed animals (*e.g.*, *Palæotherium*) is the marsh-dwelling tapir of southern Asia and tropical America. It is reminiscent of the times when hoofed animals were confined to marshes. After the Eocene period most of them began to spread over grassy plains, and those which grew in brain-power as well as in the adaptation of the bodily frame for the new mode of life, eventually passed into the rhinoceroses and horses on the one hand, and into the antelopes, cattle, deer and their allies on the other. Every stage in this progress can be traced by the fossils discovered in successive geological formations above the Eocene.

One group of the Eocene marsh-dwelling hoofed animals which did not advance much in brain-power though growing rapidly in bulk of body as it passed to the grassy plains, has also survived, but only by a curious accident. This is the order of elephants, in which during successive geological periods after the Eocene, the legs grew continually longer while the neck remained comparatively short, and ability to feed on the ground could only be maintained by the lengthening of the face and lower jaw. When this strange makeshift had reached its extreme mechanical inefficiency (at the end of the Miocene period), the chin suddenly shortened in the animals that survived, while the long soft face thus left without support eventually developed into the proboscis which is so characteristic a feature of the existing elephants.

All the other Eocene and Oligocene mammals, however, which increased in bodily bulk without at the same time advancing in brain-power, soon became extinct. They were, so to speak, precocious sports. Several of them, such as the *Dinoceras* and *Titanotherium* of North America and the *Arsinoitherium* of Egypt, were provided with formidable horns.

Some of the earliest mammals of the Eocene period migrated from the land into the sea, and eventually became completely adapted for an aquatic life in the form of whales and porpoises. These pioneers of sea-mammals have not yet been discovered; but the Zeuglodonts, of which a skull and other remains have been found in the Barton Clay, afford some clue to the nature of their land-ancestry. Specimens from the Eocene of Egypt suggest that this ancestry is to be found among the flesh-eating Creodonta.

Our knowledge of all these phenomena in the history of mammalian life still depends on very fragmentary material from many localities. In western Europe at least it is increased mainly by accidental discoveries made by those who actually reside on the Lower Tertiary formations and keep a watchful eye on all excavations and natural exposures. There is much need for this watchfulness along the Hampshire coast, where every well-preserved fossil bone or tooth is likely to prove of scientific value.

Report of General Lectures delivered during the Winter Session, 1909-10.

The Palace of Pharaoh-Hophra and other finds in Egypt during the season 1908-9.

This lecture was given by G. A. Wainwright, Esq., of the British School of Archæology in Egypt, on the 13th Nov., 1909, and was open to the public on the purchase of tickets. The chair was taken by Dr. J. Roberts Thomson, J.P., and the hall was full to the door. Mr. Wainwright, who is one of Professor Flinders Petrie's assistants, began by describing generally the obstacles and difficulties in the way of Egyptian exploration, and the progress which had been made notwithstanding. A series of very beautiful lantern slides was then shown, from actual photographs, illustrating the contents of a 17th dynasty coffin found in a valley near the Tombs of the kings, including various objects of domestic and personal use; also some particularly interesting wall-paintings of the 17th dynasty. Next, views at Memphis were shown, illustrating the excavations made round the statue of Ramses II to a depth of 15 ft., to ascertain whether any earlier remains existed. A description of the great temple of Ptah was given—an immense building, one of the greatest ever erected. After some more slides of miscellaneous objects, a description of the Palace of Pharaoh-Hophra was given, with views of the site. This dates from the 6th century B.C., and was lined throughout with white limestone, for the sake of coolness; some of the columns were 50 ft. high and the area of the building was about 400 ft. square. Some illustrations of fragments of plate armour were shown, disposing of the doubt as to whether armour was worn by the old Egyptians · also drawings made by Professor Flinders Petrie, showing a jubilee festival, with dancing figures, and the lecture was concluded by showing photographs of a series of carved stone heads representing the different foreign races in ancient Egypt. These most interesting carvings were found at Memphis.

My experiences of New Guinea and its Wild Savages.

A lecture on this subject was given by J. E. Liddiard, Esq., F.R.G.S., on the 11th Dec., 1909, Dr. Moorhead being in the chair. Mr. Liddiard began with a brief account of the history and statistical geography of the island, and proceeded to describe its physical characteristics, mentioning that the greater part of the country is covered with dense forests, intersected by innumerable rivers. He then gave an account of the difficulties attending travel in New Guinea, the coast being wild and rocky, making landing extremely dangerous, while the absence of roads made cross country travel almost impossible. Then the various savage and venomous creatures—sharks in the sea, alligators in the

rivers, and snakes, scorpions and centipedes in the country, besides mosquitoes everywhere—add much to the difficulty, and the universal prevalence of fever always had to be reckoned with. The lecturer then described the civil institutions of modern civilization—courts, schools, prisons, etc., to the latter of which he gave great praise, as reformatories in which the prisoner is taught and elevated. He then gave an account of Port Moresby, the chief town, and the surrounding country and villages, the native architecture and arrangement of the houses, with a description of dress and ornaments, habits and customs of the natives. Weapons were described, as well as native manufactures, chiefly of pottery, also the method of fishing. The lecture throughout was illustrated with lantern slides, showing the beauty of the scenery and the picturesqueness of the native life.

How to know the Wild Flowers.

A lecture on this subject was given on the 15th Jan. by J. F. Rayner, Esq., of Southampton, Miss A. Rooper being in the chair. Mr. Rayner began by showing the necessity of close acquaintance with the features of plant life, and described the system of botanical nomenclature, which is based on the more important external features of the plants, each plant having two names, the name of the genus to which it belongs and the distinguishing name of the particular species of which it is a specimen. Flowering plants are largely classified according to variations in the blossoms themselves, and it is therefore important to know the characteristic parts of a flower, on the variations of which almost everything in the recognition of flowering plants depends. The lecturer then proceeded to describe the classification of plants; taking the great group of Phanerogamia, this is first divided into sub-groups Angiospermia and Gymnospermia. The Angiospermia are divided into the great classes of Dicotyledones and Monocotyledones, which in turn branch into series and orders and these again into species; the same method being applied to the other great groups. The lecturer then showed how the name of a plant can be got at by examination of the plant, relegating it to group, class, series, order and genus according to its characteristics, finally arriving at the particular species. Seldom, however, is it necessary to go through the whole of this process, a little experience quickly teaching the student to allot the plant to its proper order with only a cursory examination. Mr. Rayner then advocated collecting, describing the aid to study given by careful and methodical collection and preservation of specimens, emphasizing the necessity of neatness and method in the work. The lecture was illustrated by diagrams of flower structure and by dried specimens from the lecturer's herbarium.

The Growth of the English Language.

This was a lecture given by Samuel Wood, Esq., F.C.A., on the 29th January, Col. Markwick being in the chair. See full report on page 55.

The Hardy Country, or the Witchery of Wessex.

On the 12th Feb., a lecture with this title was given by H. Pouncy, Esq., the Asst. Secretary of the Dorset Field Club, the chair being taken by J. E. Liddiard, Esq., F.R.G.S. The public were admitted to this lecture on the purchase of tickets. The lecture was illustrated by lantern slides of great interest and exceptional beauty, and Mr. Pouncy introduced his subject by showing some typical views of the Wessex of romance and portraits of Wessex celebrities, proceeding to describe and illustrate a regular tour through the near part of the country made so familiar to us by Mr. Hardy in his novels. Leaving Sandbourne (Bournemouth), the audience was conducted to Poole Harbour and up the Frome, by Anglebury (Wareham) to Wellbridge (Wool), over Egdon Heath to Kingsbere (Bere Regis) and on through Weatherbury (Puddletown) to Mr. Hardy's birthplace at Upper Mellstock (Higher Bockhampton). The ground covered corresponded to a considerable extent with the route taken during the previous summer on one of the Society's excursions, when Mr. Pouncy and Mr. C. J. Hankinson, J.P. (Clive Holland) acted as guides. The lecture was varied from time to time by the quotation of passages in dialect from Mr. Hardy's novels and by the singing of Wessex songs.

Temples and Life in South India.

This lecture was given by Claude Lyon, Esq., on the 26th February, the chair being taken by Dr. A. W. Thomas. The lecturer began by referring to the extraordinary success of British rule in India and described the facility with which the journey to India could now be made, but pointed out that few travellers go to Madras and the South of India, and that for that reason he had chosen that district as the subject of his lecture. A number of very fine lantern slides were shown, mostly from photographs taken by the lecturer's father, and the greater part of them illustrated some of the wonderful monuments of Hindu architecture to be found in Southern India, mostly dating from the 13th and 14th centuries. The principal buildings illustrated and described were:—The Temple of Rameswaram on an island in the Manaai Strait; the Temple at Tinnevelly, a typical Hindu temple; the Juggernaut car at Srivillipatar; the Temple of Siva and Minakshi at Madura; the great gopura of the Temple of Siva at Tanjore; the little Temple of Subrahmanga at Tanjore, with exquisite carving; the small Temple of Siva at Perur. Throughout the lecture Mr. Lyon gave descriptions of Hindu mythology and of other religions in the East generally.

The Chemical Analysis of Solutions.

A lecture upon this subject was given on the 12th March by Hubert Painter, Esq., B.Sc., F.C.S., Dr. A. W. Thomas being in the chair. The lecture throughout was illustrated by means of experiments, the solutions being placed in glass cells in the lantern, and in the projection on the screen could be traced the various changes in colour, consistency, etc., which took place. Mr. Painter began by enumerating the different known kinds of solutions, viz., gases in

gases, gases in liquids, liquids in liquids, solids in liquids and solids in solids. Solutions in liquids were the only ones considered in that lecture. When the proportion of the substance dissolved (the solute) to the solvent does not exceed a certain amount, there is no tendency in the solution for the constituents to separate under the force of gravity—thus a true solution is not formed when milk and Scott's Emulsion are poured together, as floating particles of oil can be seen, as was shown by means of the lantern. The lecturer then described the ionic hypothesis, which regards certain so-called elements as being really compounds, sodium for instance consisting of an atom of an element called sodion combined with an electron or negatively electrified particle having an atomic weight of about one-thousandth of that of hydrogen. In many cases of solution it is considered that these elemental substances, known as ions, are produced, they having different properties from the corresponding substances, hitherto called elements, of which they form a part. The analysis of solutions is to a great extent concerned with the detection and identification of ions, two especially being of great importance, that called hydrion (the ionic form of hydrogen) being characteristic of acids, and that called hydroxidion being characteristic of alkalies. Various experiments were then performed, some to show characteristic changes in colour due to the admixture of certain liquids or classes of liquids, others to show the precipitation of solids from a mixture of liquids; and the lecturer acknowledged with thanks the assistance he had received in the preparation of these experiments from Miss Hawker, Mr. Barlow and Mr. Stubbs.

The Blossoming of the Trees.

This was the title of a lecture given by Miss Ida M. Roper, F.L.S., of Bristol, on the 9th April, the chair being taken by Miss C. Agnes Rooper. Miss Roper said that little attention was given to the blossoms of our native trees, probably because they were inconspicuous compared with the showy and fragrant flowers of many other species. There were about 18 species, belonging to six of the natural orders, to mention, disregarding the trees that had been introduced. The flower buds are formed late in the season, lying dormant through the winter, and in the after-development of the flower trees could be grouped under four headings:—(1) Those flowering early in spring before the leaves expand; (2) Those in which the inflorescence takes the form of catkins and becomes perfect before the leaves open; (3) Those also bearing catkins, but when the leaves are further advanced; (4) Those with white or coloured flowers, usually in perfection when the leaves are well advanced. There is another division of the trees into monœcious, in which stamen-bearing flowers and ovary-bearing flowers are found on the same tree, and diœcious, in which the two kinds of flowers were found only on separate trees. The lecturer then described the four groups in turn, mentioning many of the species belonging to them and describing their habits and characteristics, and a number of very fine lantern slides were shown, illustrating different stages in the development of trees, with enlarged photographs and diagrams of leaves, flowers and other details.

Report of General Summer Excursions, 1910.

Visit to the British Museum.

On May 25th, by kind invitation of the President, Dr. A. Smith Woodward, a party went for the day to South Kensington, where they were received at the Natural History Museum by Dr. Woodward, who conducted them round the Palæontological Galleries, of which he is the keeper. A most interesting time was spent, all the most important and recent additions to the Museum being exhibited and explained to the visitors.—*See* Geological Section.

Lulworth Cove.

This excursion was arranged by the Bournemouth Students' Association, in connection with the course of University Extension lectures on Nature Study, the members of this society being invited to join. The excursion took place on the 4th of June, under the leadership of the Rev. E. C. Spicer, M.A., F.G.S., and was well attended. On reaching the cove the peculiar alternations of strata on the eastern side were examined as well as the extraordinary contortions in places—evidence of the work of subterraneous and lateral pressure. After an interval for lunch the ascent was made to the Coastguard station from which a fine view, both of land and sea, is obtainable. Then the eastern side of the Cove was visited and the Fossil Forest examined, regarding which Dr. Ord gave a description of its origin and condition. Mr. Spicer afterwards dilated upon the unusual geological interest of the place, and later the company gathered for tea at the Cove Hotel, returning to Bournemouth by steamer in the evening.

Shepton Mallet and District.

This excursion was arranged for the 11th of May, but was postponed owing to the lamented death of His Majesty King Edward VII, and ultimately took place on the 15th of June. On arrival at Shepton Mallet the party took carriages and drove eastward to a quarry at Holwell where Dr. Ord gave an account of the carboniferous limestone there revealed in section. In it occur dykes of different structure from the surrounding rocks, and these were left by the quarrymen as useless. They had been examined fifty years ago by the late Charles Moore, of Bath, who found they were of very much more recent formation than the surrounding rocks, being of Rhætic and Liassic age, as proved by the fossil fish and other remains found therein. It was supposed that the carboniferous strata had been hollowed out by underground streams and that when later it formed the bed of

the Rhætic sea these fissures were filled up with sand and pebbles and the remains of fish and reptiles. Amongst the other remains were found part of the skeleton of the earliest mammal known, called Microlestes, a marsupial closely resembling the kangaroo rat of Australia. Dr. Ord and Mr. Sherring remained at the quarry to search for fossils while the rest of the party resumed the drive to Nunney and proceeded to inspect the castle there. This appears to be something between a manor house and a fortified castle and is surrounded by a moat and is now in a dilapidated condition. After lunch, Nunney Church was inspected, the Rector, the Rev. W. Powell-Davies, kindly describing the various points of interest, including a Norman font and recumbent effigies of the Delamere, Paulett, and Prater families. The party then went on to Mells, where the handsome church was inspected, the Rector, the Rev. E. D. Lear, explaining its beauties in detail. The tower contains eight bells, and the stained glass windows are interesting as having been made and designed locally. There is an early font, a fine brass candelabrum, date 1720, and a magnificent wooden roof, also some good brasses. The Manor-house, dating from 1420, was next visited and other points of interest in the charming village. Tea was taken at the Talbot Inn, after which a business meeting was held, in the course of which Mr. C. J. Hankinson, J.P., was elected a Vice-President. After tea the Rector showed the party over his beautiful garden, and the company then returned by carriage to Shepton Mallet, catching the last train back to Bournemouth. The thanks of the Society are due to Mr. W. F. Barnes, of the Shepton Mallet Natural History Society, who very kindly made the necessary local arrangements and acted as general conductor throughout the day.

Some time afterwards the historic ruin known as Nunney Castle, situate about three miles from Frome, partially collapsed. Practically the whole of that side of the castle facing the north-west fell in, causing a great gap, and completely destroying the beauty of the ancient building. Archæologists will greatly regret the breaking up of the old castle, which was probably due to the tremendously heavy rains, which have soaked through the ruined walls. The fine carving in the main doorway is destroyed and buried under a mass of huge stones. The part of the building which has collapsed has for two or three years past shown signs of weakness. It was this particular portion of the castle that came in for the worst of the bombardment which the castle underwent at the hands of Cromwell's men. Nunney Castle was for many years the seat of the de la Mere family. In the time of Richard II the castle passed into the family of Paulet, afterwards Dukes of Bolton. In the time of Queen Elizabeth it belonged to Sir William Paulet, K.G., the first Marquis of Winchester, by whom the estate was disposed, and after passing through several other families it is now the property of Mr. R. Baily-Neale. The walls, now overgrown with ivy, are of great strength, the side walls being 7ft. 6in. in thickness, and those of the tower 7ft., and within these are passages and staircases. A moat, 22ft. wide and 10ft. deep, which communicated with a stream flowing near, surrounded the whole building. During the Civil War, the

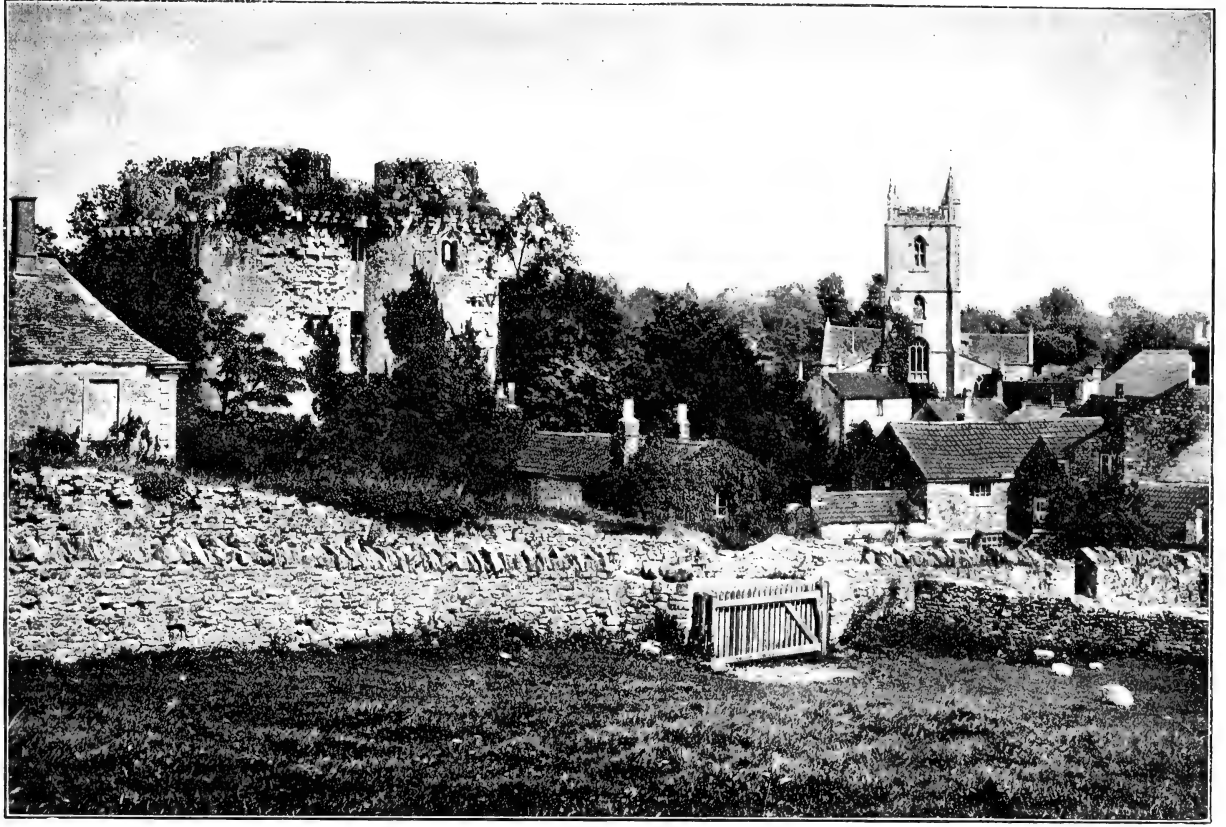

Photo by F. Frith & Co., Ltd.

Nunney Castle, Somerset.

BRITISH
NATURAL HISTORY

castle being then held by the Prater family, it was garrisoned for the King, and after a determined resistance to the attacks of the Parliamentary Forces, at length surrendered on condition that the garrison should be allowed to go to their own homes.

A day in the New Forest.

On the 29th of June a large number of members went by train to Brockenhurst, there taking brakes for a tour in the northern part of the Forest. Driving by Lyndhurst and Minstead to Rufus Stone, a halt was there made, the party walking down to the spot where Rufus met his death. Mr. Brownen then read a paper on the death of that king, in which he showed that the evidence was strongly in favour of Rufus having been murdered as the result of a plot, to which his brother Henry was probably privy, rather than of his having been shot by accident. The contemporary chronicles favour this view, while not actually stating it in plain words, and it is the later ones that give prominence to the theory of accidental death. From Rufus stone, now a popular picnic resort and much vulgarized by the presence of ginger-beer booths and cocoanut shies, the drive was resumed through a less frequented part of the Forest to Fritham, in the north-western portion. In this remote spot is situated a large powder factory, but its chief interest lies in the proximity of the remains of Roman potteries in the neighbourhood, many of the party walking about a mile into the heart of the forest to Crockhill Green, where the site of one of these potteries was found and many fragments picked up. There are other potteries in the Sloden enclosure near by, but time did not allow a visit to these, nor to the famous yew trees there. These potteries are due toan outcrop of the Lower Bagshot Clays, and were worked by the Romans in the third century. Near Fritham is Iron's Well, the water of which was once reputed of value medicinally, but now neglected. Here one of the party came close upon a group of deer that had come down to drink at the stream just beyond the well. From Fritham the drive was continued to Brook, where tea was provided at the golf cottage, and thence by Cadnam to Brockenhurst, where train was taken back to Bournemouth. The day was a most enjoyable one, the magnificent vegetation of the Forest being in full perfection.

Winchester.

This excursion took place on the 27th of July, a large party going by train to Winchester, where they were met by Mr. N. C. H. Nisbett, A.R.I.B.A., who kindly acted as conductor, his association with the architectural and historical interest of the city making him most valuable in that capacity. The Cathedral was first visited. Amongst the interesting objects seen were the "Pilgrim's Gate," the oldest iron grille in England; the black Tournai Font, of the 12th century, carved with legends of St. Nicholas; the chantry of Bishop Wykeham; the Gardiner chantry; the Lady chapel; the reredos, etc. The great interest of the

Cathedral lies in its having been transformed by Wykeham from a Norman building to one of the Perpendicular style, the Norman work having been completely encased in masonry of the later period, and the effect of this transformation was viewed with great attention. On the outside the shoring necessary for the repairs now in progress was inspected, and the underpinning by which it is hoped to render the Cathedral safe for long years to come. A visit was next paid to Wolvesey Castle, the home of Saxon Kings and mediaeval Bishops, where the great hall and the keep were examined, the latter of Norman date and ascribed to Bishop Henry de Blois (1129-1171). Members then walked by the meadow path to St. Cross, where they were kindly received by the Master, the Rev. Canon Causton, M.A. In the dining hall of the hospital many interesting relics are preserved, furniture, stained glass, etc., dating from the times of de Blois and Cardinal Beaufort. The church, too, is of great interest and beauty, being principally of Norman date and containing interesting relics. A visit was next paid to the beautiful gardens and fishpond within the precincts, through the courtesy of Canon Causton, and the party then walked back to Winchester. Tea was taken at Dumper's restaurant, in the course of which Mr. Nesbitt was heartily thanked for his kindness in conducting the party, and the return to Bournemouth was made by the 5.8 train.

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Milton Abbey. On the 17th of August about 40 members took train to Blandford and drove thence through Stickland to the interesting village of Milton Abbas. Here they were met by the Vicar, the Rev. Herbert Pentin, M.A., F.S.A., Hon. Secretary of the Dorset Field Club, who very kindly acted as guide throughout the day, and forthwith conducted the company through the magnificent woods to the little Norman chapel of St. Catherine. This chapel for some time was desecrated, being used as a cottage and as a timber store, but has now been restored to its use for occasional divine service. On stone by the south door is an "Indulgence" inscription, "Indulgencia H' : Sci : Loci : ce : x : dies," while on the north side is a stone containing small holes, in which it has been the custom from time immemorial (and indeed still is) for the village maidens to place their fingers while praying to St. Catherine to give them a husband. From this chapel is seen a very beautiful view of the Abbey church of Milton standing in the midst of a lawn of the brightest green and surrounded on all sides by the woods. The building, consisting of choir and transepts only, was commenced in 1322 and went on till 1539, and is a fine specimen of the development of the decorated style, from early to late, merging into perpendicular in the tower and north transept. It contains many tombs and other objects of interest, in particular a carved wooden 15th century tabernacle, formerly used for the reservation of the Sacrament; but perhaps its most striking feature is the groined stone roof throughout, in a fine state of preservation. A return was next made to the village, the history of which is interesting, explaining as it does its curious arrangement. Milton

was formerly a market town of some size, till the owner, Lord Milton, some 130 years ago, pulled down the whole place for the benefit of his own house on the north side of the abbey, and built the present village to take its place, with its own church and almshouses. The single broad street is on a steep hill and the cottages are arranged in pairs on each side, with a chestnut tree between each pair, the church and almshouses in the centre of each side respectively. Tea was taken at the Hambro' Arms and a start was made about 5 o'clock for Blandford to take train again for the return to Bournemouth. Milton Abbey is somewhat inaccessible and to this is due the fact that it is so little known, but the beauty and interest of the building and its surroundings are perhaps unequalled in England.

Garden Party at the Elms. On the 7th of September Dr. and Mrs. Crallan very kindly entertained the members of the Society at a garden party at their residence, "The Elms," Parkstone. About 90 ladies and gentlemen were present, including the President-Elect of the Society, Dr. Dukinfield Scott, the distinguished President of the Linnæan Society. After tea, which was arranged on the lawn, the guests had the opportunity of examining the magnificent collection of butterflies and moths, one of the finest in the country, belonging to Dr. Crallan, and of seeing the rose garden recently laid out, and the interesting collection of rare and beautiful plants growing either under glass or in the open. A pleasing selection of music was performed by the Artillery Territorial Band, and the weather was all that could be wished for such an occasion. After a stay of two hours the company dispersed, having spent a pleasant afternoon amongst delightful surroundings, and much gratified by the kind reception they had received at the hands of Dr. and Mrs. Crallan.

East Lulworth. This excursion was arranged for the 14th of September and a number of members travelled by train to Wool, driving thence to East Lulworth. Unfortunately at this point the rain, which had been threatening all the morning, increased to a steady downpour, with the result that all but a few of the most enthusiastic drove straight back to Wareham. It had been intended to visit Arish Mell and Flowers Barrow, and the few enthusiasts did actually reach the latter place, but the state of the weather and the ground was such that a proper examination of the interesting earthworks there was impossible. It is hoped that this excursion may be repeated under more favourable circumstances.

Proceedings of Sections.

Archæological and Historical Section.

CHAIRMAN: G. BROWNEN, ESQ., F.C.S.

The interest in this section has been well maintained during the year, although some of its excursions were carried out under the discomforts of stormy weather.

11 Nov., 1909. The first sectional meeting. The chairman read a review of "The Antiquarian and Historical progress and discovery during the year 1908-9."

20 Jan., 1910 At this, the second sectional meeting, D. Chambers, Esq., of Southbourne, read a paper on "Some recent prehistoric discoveries at Southbourne and Pokesdown," and exhibited some of the relics found.

24 Feb., 1910. The late A. Scott, Esq., B.A., then hon. Librarian of the Society, read a paper upon "Sopley Church," and illustrated it by photographs and drawings. This subject was selected for publication in the next volume of our Transactions and we deeply regret that its author did not live long enough to revise it himself for publication.

There were no sectional meetings in March and April.

The sectional Excursions were in May, June and August as follows:—

28 May, 1910. An excursion to Godwinscroft and Sopley, via Derrit Lane, conducted by Messrs. Brownen and Scott. The former described the Battle of Sirlei (6th century) on the earthworks and (the late) Mr. Scott described Sopley Church.

29 June, 1910. An excursion to the New Forest, visiting Rufus Stone, where a short paper was read by the chairman and conductor, Mr. Brownen, on "Accident or Murder?" The party then proceeded to the Romano-British Potteries near Fritham.

31 Aug., 1910. An excursion to Boldre and Brockenhurst arranged conjointly with the Photographic section. Mr. Brownen described Boldre Church.

Besides these sectional meetings and excursions there were also others having great Antiquarian interest during the past year. These may be scheduled as follows :—

15 Nov., 1909. A general lecture to the Society by G. A. Wainwright, Esq., of the British School of Egyptian Archæology, on the "Palace of Pharaoh Hophra."

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11 May, 1910. The Geological excursion to the Mendips led by Dr. Ord, the sectional chairman, visited Nunney Castle and Church.

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27 July, 1910. A general excursion to Winchester and St. Cross was conducted round Winchester Cathedral, Wolvesley Castle and St. Cross by Mr. Nisbett, A.R.I.B.A., of Winchester.

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17 Aug., 1910. A general excursion to Milton Abbas was conducted to the Abbey and Churches by the Rev. H. Pentin, M.A., F.S.A.

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14 Sep., 1910. The general excursion to Lulworth and Flowers Barrow was interrupted by stormy weather.

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28 Sep., 1910. A Geological excursion to Portisham was conducted by Dr. H. Colley March, F.S.A., and were shown some interesting antiquarian relics in that neighbourhood.

Botanical Section.

CHAIRMAN : MISS C. AGNES ROOPER.

Herbarium. During the Winter months, 1909-10, certain members under the leadership of the chairman, Miss C. Agnes Rooper, met every Tuesday morning in the Society's Rooms for the purpose of arranging the Herbarium. In this work they were greatly assisted by the kind aid of the late Mr. A. Scott and Mr. R. Sherring, F.L.S. To the former the section is specially indebted for the labour, time and care with which he carried out a systematic method of procedure and of arrangement, and to the latter for numerous and interesting additions to the collection, particularly a complete collection of the Equisetœ growing in the neighbourhood of Bournemouth. The Herbarium has also been enriched with other presents from kind donors, viz :

a valuable collection of dried and prepared flowers from the Rev. E. Linton and another of Rubi from the Rev. W. Moyle Rogers, the well known specialist in these plants. Other specimens have been given by Mrs. Nicholson and Miss Firbank, and the Bournemouth Lily by the late Mr. A. Scott.

Papers contributed. Thursday, Nov. 18th, 1909. A paper was read at 4.30 in the Society's Room by Miss C. Agnes Rooper on "Symbiosis in Plants." Feb. 3rd, 1910. Dr. Dixon read a paper on the "Life History of a Fern," also in the Society's Room, at 4.30. March 17th. Miss C. Agnes Rooper read a paper on "English Tree Forms," in the Society's Room at 4.30, illustrated by lantern slides.

Summer Excursions. Owing to the wet weather so prevalent last summer but few excursions were made. They were as follows:—April 11th, to Arnewood, near New Milton, when Miss Ida Roper, F.L.S., was one of the party. April 12th, to Swanage. Miss Ida Roper, F.L.S., was again present. Four clumps of gladiolus were discovered by Mr. Sherring, F.L.S., in a new locality. May 7th, to Stanpit, Christchurch. August 6th, to Corfe Castle, whence the party walked by Scotland Farm to Wareham. Bartsia viscosa was found by Mrs. Nicholson, and a white specimen of the prunella vulgaris by the late Mr. A. Scott. August 10th, a general excursion to Oberwater in combination with the Zoological Section. Lastly, September 10th, in combination with the Geographical Section to Corfe, when Miss Firbank found a new and pretty variety of the calluna vulgaris.

Geographical Section.

CHAIRMAN: JAMES E. LIDDIARD, ESQ., F.R.G.S.

The Fiji Islands. At the first meeting of this section, on Nov. 27th, 1909, an illustrated lecture was given by the chairman on "The lovely Islands of the Fiji group, and their People."

In opening the meeting the chairman said it was encouraging to note the growing insistence of the necessity for fuller geographical knowledge, for in future none can be regarded as a man or woman of real education and culture to whom geography, in no narrow sense, is virtually a closed book. History cannot be intelligently understood without a clear knowledge of the geography of history.

Indeed, to read the daily papers intelligently requires either geographical knowledge or constant reference to maps, and he strongly recommended readers to make a practice of such reference when they felt the need of it. He thought that parents in the home might do much to encourage the study of commercial geography by asking questions which would excite interest and stimulate enquiry. After referring to the recent great geographical achievements of Sir Sven Hedin, Commander Peary and Sir Ernest Shackleton, he said that while he gladly and gratefully recognised the work of those who seek to extend our knowledge of far-distant and out-of-the-way parts of the globe, the importance of the *intensive* study of limited areas must not be overlooked, and this can best be promoted by local Societies, such as our own. Coming to the subject for the evening the lecturer said that excluding New Caledonia, which is of older formation than the rest, all the islands of the S. Pacific consist of three well-marked types, i.e., the atoll or lagoon coral islands, the raised coral islands, and the mountainous islands of volcanic formation. In describing these various types of islands, he mentioned that illustrations of each are to be found in the Fiji group, and said that the lakes or lagoons which the reefs enclose form hot-beds for wonderful marine growths and the most beautiful corals, and quoted Milton's apt description of these lovely sea-girt isles:

> "That like to rich and varied gems inlay
> The unadorned bosom of the deep."

After describing the position of the group, he said that the appearance of the islands is grandly picturesque, with richly-wooded mountains rising to a height of nearly 5,000ft., intersected by valleys and gorges worn by countless streams, and a palm-fringed coast where the brown roofs of the native villages peep out among the rich tropical verdure, while outside all come the narrow strip of sand, the smooth expanse of the lagoon, and the white ring of surf, as the ocean waves break upon the reef. After describing Suva and Levuka, the new and the old capitals, next were seen charming pictures of the scenery of the noble Rewa, and the lecturer said it would be difficult to overrate the beauty of the Rewa Valley, which is flanked by a lovely range of mountains, weird in shape, whose exquisitely blue colour is made the more remarkable by the intense richness and fertility of the river basin. Then followed illustrations and descriptions of the primitive bridges and the river house-boats, also the native houses and villages, and the arrangements for local government were explained. Some interesting pictures of the natives were shown, the native method of obtaining fire by the rubbing together of pieces of wood was described and illustrated, also modes of cooking and preparing food. There were some striking pictures of fire-walkers, and the mystery was explained. The manufacture of pottery was illustrated. In relation to educational work, the geography lessons were said to be specially interesting. In conclusion, the lecturer referred to the old cannibal practices of the people, and to the marvellous changes resulting from the influence of the Word of God and the labours of the missionaries.

Dorset Place-names. On January 22nd, 1910, a paper was read by W. J. Stanton, Esq., on "The Association of some Dorset Place-names with the History of the County." This was supplementary to one given last year on "The Place Names of Dorset." James E. Liddiard, Esq., F.R.G.S., presided. The lecturer said that for the purpose of classification he would divide the history of the county into the following periods, viz., pre-Roman, Anglo-Saxon, Danish, Norman and post-Norman, although it is impossible to adhere to this arrangement, as some names were given at an early period and received additions later. 1. The place names of the pre-Roman period are connected with the natural features of the county for the most part, and most of the rivers have names of British derivation. 2. Very few names have been handed down from the Roman period. 3. The majority of Dorset names are Anglo-Saxon, of which many examples were given. 4. The Danes did not leave us many names. 5. The Norman Conquest brought about many changes in ownership, many of the manors being bestowed on those who had assisted William in his invasion of the country. 6. In post-Norman times several places received their names, e.g., Toller Fratrum, Friar Magna and West Knighton belonged to the Knight Hospitallers.

Egypt. On Feb. 19th, 1910, a lecture was given by G. Brumell, Esq., A.R.I.B.A., on "Some personal impressions of Egypt." The chairman of the section, James E. Liddiard, Esq., F.R.G.S., presided. Mr. Brumell began by briefly describing the geographical position and conditions of Egypt, pointing out that, except for the Delta and the Fayum, Egypt practically consists of the Nile Valley, though politically it embraces a very much larger territory, for the greater part consisting of sandy and rocky deserts. He then proceeded to show a series of lantern slides, all of them from photographs taken by himself, and illustrating a number of aspects of scenery and life in modern Egypt.

China and Japan. On March 5th, 1910, a paper was read by the Rev. W. Middleton, entitled, "Reminiscences of China and Japan in the early sixties." The chair was occupied by James E. Liddiard, Esq., F.R.G.S. Mr. Middleton first alluded to the three "affairs" on the Peiho in 1858-9-60, in which he took part. In the subsequent advance on Tientsin and Peking, the Chinese, under a flag of truce, petitioned to negotiate terms of surrender, but treacherously surrounded and made prisoners our representatives who were sent out to meet them. These, twenty-six in all, were brutally treated, and only eleven survived to tell the tale. To punish this vile atrocity it was decided to loot and destroy the far-famed Summer Palace, and this action was briefly described.

Account of a School Excursion. On April 16th, 1910, J. Scattergood, Esq., Head Master of the Alma Road Council School, gave "A descriptive account of a School Excursion to the Isle of Wight"—a recent experiment in geographical teaching. James E. Liddiard, Esq., F.R.G.S., presided.

Deploring the fact that geography was one of the least adequately treated of the subjects of the time-table, the lecturer pointed out that there is now a decided stimulus to independent deliberation upon questions of method and anxious experiment to discover the best direction in which further advance should be sought. Rousseau insisted that the beginnings of geography should be in observation lessons and the study of the home district, and the exponents of modern geography require observation and influence as the basis of all geographical study. The programme compiled for the use of the boys who made the tour, indicated the amount of geographical study of the higest educational value which a school journey could provide, and the boys' notebooks showed how thoroughly the work had been done. Each day and every day there was observation and inference, comparison and contrast. In concluding, the lecturer said that if educational excursions are to become at all general, education authorities must be prepared to allow them to be taken in school time even if they felt bound to leave the raising of funds to voluntary effort.

Excursions. On May 28th, 1910, there was a joint Archæological, Botanical and Geographical Excursion to Sopley and Godwinscroft, which was conducted by G. Brownen, Esq. On September 10th, 1910, the Botanical and Geographical Sections united in an excursion to Wareham under the charge of Miss Agnes C. Rooper.

Geological Section.

CHAIRMAN: DR. WILLIAM T. ORD, F.G.S.

The Glacial Period in Dorset. The winter work of this section was opened on December 2nd, 1909, by an important paper by Dr. Colley March, F.S.A. (Vice-President of the Dorset Field Club), entitled "Dorset during the Glacial Period," which is presented in full on page 71. The views advocated therein being somewhat in advance of those held by the leading authorities, and there having been no time for a discussion on the subject, the matter was postponed until the next monthly meeting of the section on January 13th. The Chairman, Dr. Ord, then opened the subject by reading a paper entitled "What evidence have we of Ice-action in Dorset?" This paper is presented on page 86. A brief discussion followed the reading of this paper, in which Dr. March, Mr. H. St. Barbe, of Lymington, and Dr. Moorhead took part. Mr. St. Barbe said that very similar conditions prevailed in Hampshire as in Dorset, and that although he had studied the surface of that county for some years, he had never found traces of ice-action. Photographs of flints which according to Dr. March's hypothesis may have been scratched by ice-action are

given in Plate IV, page 71. Both these meetings were attended by some forty members, and much interest was excited by the important and controversial nature of the subject. It may be noted that the views upheld by Dr. Ord were substantially those advanced by Professor Bonney in his subsequent address as President of the British Association for the Advancement of Science, on "The Ice Age in Western Europe," at the Sheffield meeting in August, 1910.

The Rivers of the South of England.

An important paper was read on February 17th, on "The Rivers of the South of England," by H. St. Barbe, Esq., of Lymington. Some forty members attended, and the lecture was illustrated by diagrams and maps. Commencing by a reference to the discrepancy generally exhibited by the rivers of this district between their present volume and the dimensions of their valleys, the streams appearing to have greatly shrunken in volume from what they must have been when their valleys were excavated, the lecturer stated that two causes could be adduced in explanation. The first cause was a change of climate, following the different elevation of the land in former times, which, with the extensive forests which then covered the country, produced a far greater rainfall. The second cause was the retreat and melting of the great ice-sheets which covered so much of the country during the glacial period. The modern theory of the mode of origin and formation of rivers, now generally accepted, was then explained, as advanced by Professor W. M. Davis, of Harvard University, and the meaning of the terms "consequent," "subsequent," and of the "beheading" of rivers was described. The effect of various earth movements, with the anticlines, synclines, and escarpments produced by them was next dwelt upon, and their action in determining the course of various rivers was explained. Examples were adduced from the present courses of the Thames, Bristol Avon, Blackwater, and Wey. The importance of the Chalk formation to rivers in the South of England was pointed out, and the cutting short of rivers by the sea in our coast districts received careful attention.

The Great Purbeck Fault.

On April 11th, Dr. W. T. Ord read a paper on "The Great Purbeck Fault, and the Geology of the Purbeck Hills." The lecture was illustrated by maps and diagrams. Referring to the unique section of the chalk strata and the great fault displayed in the magnificent cliffs of Ballard Down, seen by every visitor on the steamers to Swanage, the lecturer explained the former conditions of the chalk range of Purbeck Hills, and their geologically recent connection with the Needles and chalk downs which formed the back-bone of the Isle of Wight. Their relation to the Hampshire basin and the more northerly ranges of chalk hills was next described. An account of "Faults," and their origin, was then given, and finally a lucid description of the great Purbeck thrust fault followed. The lecture was illustrated by a number of large diagrams.

The Society's Geological Collection. During the winter months the work of mounting and arranging the geological specimens belonging to the Society was continued under the able directorship of Mr. Parkinson Curtis, assisted by Mr. H. Le Jeune, Mr. Wells and Mr. Stubbs. The cabinet presented by Dr. Crallan is now practically full and a second cabinet is urgently needed, as more than sufficient specimens to fill another cabinet are awaiting arrangement. The Committee tender their hearty thanks to Mr. Parkinson Curtis and his helpers for the work they have so successfully accomplished, and much regret to learn that Mr. Curtis finds he is unable to continue his labours during the coming session.

Summer Excursions. Owing to the lamented death of King Edward an excursion inaugurating the summer session was postponed from May to June. During May, the Geologists' Association of London held a four days excursion at Swanage, to which members of this Society were kindly admitted. On May 17th the Association visited Bournemouth, and under the conductorship of Dr. Ord, examined portions of the Bournemouth Cliffs, Honeycomb Chine and Hengistbury Head. An excursion was also made by the Students' Association, and members of this Society, to Lulworth Cove on June 4th, under the leadership of the Rev. E. C. Spicer, F.G.S., Oxford Extension Lecturer on Nature Study. This was largely attended and proved of great interest.

Excursion the Mendips. The Geological Section took part in the General excursion to the Mendips on June 15th (see page 33), when some very interesting spots were visited. Dr. Ord conducted the party, assisted by Mr. W. F. Barnes, of the Shepton Mallet Natural History Society. The Holwell quarries were explored, and the celebrated dykes formed by Liassic and Rhætic fillings-in of ancient fissures in the Carboniferous Limestone examined. It was from there that the late Charles Moore, of Bath, obtained such a harvest of Rhætic fossils, including remains of the earliest known mammal—if it be a mammal, which is not quite certain—a small animal about the size of a rat, probably a marsupial resembling the modern kangaroo on a minute scale. These valuable specimens together with enormous numbers of teeth of fish and reptiles, are now to be seen at the Bath Museum. An address on the Geology of the Mendips, with special reference to these matters. was given by Dr. Ord, after which the rest of the party proceeded to Nunney Castle. Among those present was Mr. V. Sherring, who many years before had known Mr. Moore and worked in these same quarries. Mr. Sherring and Dr. Ord remained behind in the hope of some "finds," and although nearly all the material has been extracted by geologists during the past 40 years, were fortunate enough to strike the exact spot where some Rhætic deposit still remains, and obtained teeth of *Acrodus* and *Hybodus*, as well as scales of *Gyrolepis* and other fish remains. These have been added to the Society's collection.

Visit to the British Museum. On May 25th, by kind invitation of the President, Dr. A. Smith Woodward, a party went for the day to South Kensington, where they were received at the Natural History Museum by Dr. Woodward, who conducted them round the Palæontological Galleries, of which he is the Keeper. A most interesting time was spent, all the most important and recent additions to the Museum being exhibited and explained to the visitors. Amongst these were the celebrated *Diplodocus carnegii*, a plaster reproduction, 80ft. in length, of the skeleton discovered in Wyoming, U.S.A., and presented to the Museum by Andrew Carnegie, Esq. Also the equally interesting remains of the largest known British Dinosaur—*Cetiosaurus leedsi*—discovered in the Oxford Clay near Peterborough, which when complete must have been 60ft. in length. The remains of the giant sloth, especially its skin and hair, with evidences of its having existed in a cave during the human period, perhaps having been kept by early man as a curiosity or fetish, were objects of especial interest, and Dr. Woodward's lucid account of their discovery was much enjoyed. Amongst other features of the day must be mentioned—in the palæo-botanical galleries—the magnificent fossil palm frond, some 4ft. by 3ft., found in the cliffs at Branksome in the Bagshot sands of the Eocene period. In the afternoon the Mineralogical galleries were visited. The kindness of the President in giving up his time on this occasion, and providing such a fascinatingly interesting programme to geologists was much appreciated.

Excursion to Barton-to-Sea. On August 3rd, the Geological Section visited Barton under the direction of Mr. H. Le Jeune, assisted by Mr. Eliot Walton, of Newmarket. After a successful fossil hunt, the party collected at a convenient spot on the beach, when a short paper was given by Mr. H. B. Wells on the Eocene formations and their relation to the Cretaceous strata, in which he described the physical and climatic conditions under which the various Eocene strata appear to have been laid down. Dr. Mahood then followed on the subject of Nummulites during the Eocene period.

Flowers Barrow and Worbarrow Bay This excursion, conducted by Dr. Ord on Sep. 14th, was largely attended and promised to be one of the most successful of the summer, but unfortunately on reaching Wareham rain commenced and continued uninterruptedly for the whole day, and although about half the party bravely went through the programme, little or no geology could be done. The excursion will, it is hoped, be repeated under more favourable circumstances in 1911.

Portesham and District. Through the kindness of Dr. Colley March a large party assembled at Dorchester and drove under his guidance, to Maiden Castle, thence through Winterbourne St. Martin to the Hardy Monument, and finally

by a wide detour to Portesham, where they were hospitably entertained by Dr. and Mrs. Colley March to tea. The excursion is described on page 39, being mainly of Archæological interest, but there were several points visited of importance to geologists. Amongst these were beds of Tertiary gravel overlying the chalk on Black Down, next the Valley of Stones, so called from the prostrate sarsen stones with which it is partly covered. The conductor here gave an account of the manner in which these stones are believed to have been derived from Tertiary deposits and of the "creep" by which they are supposed to have proceeded to the bottom of the valleys. Dr. Ord supplemented this by a statement as to their silicious constituents, and remarked upon the signs of stratification seen in the arrangement of the large water-worn pebbles and the finer constituents in the bigger stones. Signs of what Dr. March considered to be deglaciation—scratchings by ice-action—were discovered on one stone and photographed by Miss Hawker. Interesting examples of chalk valleys, with evidences of old vents or water channels, were then visited. Further on Dr. March pointed out what he believed were further examples of ice-action, in support of the opinions advanced in his paper, "Dorset during the Glacial Age," page 71. These he described as "roches moutonneés," and "perched blocks," also an area covered with flint rubble and earth which he considered might represent the remains of a glacial moraine. After tea Dr. March showed his large collection of flints and other stones, chiefly obtained in the neighbourhood of Portesham, on which he bases his views as to the glaciation of Dorset. These were examined with much interest and it was generally agreed that their condition was not easy of explanation under the usual geological hypotheses. A few of these scratched flints are illustrated on Plate IV, page 71.

Microscopical and Zoological Sections.

Chairmen: Dr. Dixon and Dr. Thomas.

The work of these Sections has been continued on the lines laid down during the previous year. The summer work of these Sections has been largely identical, so it has been decided to combine the account of their respective work. During the winter session the Microscopical Section held five meetings, which were as follows:—

Dec. 9th. A description of the more interesting specimens found during the summer, by Dr. Dixon; and an exhibition of specimens under microscopes, by members.

Jan. 24th. A practical demonstration of the methods used in studying the structure of leaves, by Dr. Dixon.

Feb. 28th. A short account of Argulus foliaceus (the fish parasite) by Dr. Thomas; also an exhibition of slides under microscopes, by members.

Mar. 10th. The early development of a Starfish, with microscope slides and diagram illustrations, by G. M. Stubbs, Esq.; also an exhibition of slides under microscopes by members.

April 28th. A paper on "Local Hybrids and their development," illustrated by microscopical specimens, by H. J. Waddington, Esq., F.L.S.

The paper on "Local Hybrids" by Mr. Waddington was an exceedingly instructive one. Mr. Waddington also showed another interesting species of Monstrilla, which should also be noted in the proceedings.

The Zoological Section held three meetings during the winter session, which were as follows: —

Dec. 16th. A paper on the "Dentition of British Mammals," illustrated by specimens, by T. B. Goodall, Esq., F.R.C.V.S., F.L.S.

After his lecture, Mr. Goodall very kindly presented to the Society the skulls of many British Mammals which he had used to illustrate his paper on dentition.

Mar. 31st. "The Synonymy of Eumichtis adusta, Esper; var chardinyi, Dup. = pavida, Boisduval," illustrated by coloured drawings by W. Parkinson Curtis, Esq., F.E.S.

Apr. 23rd. A paper on "The Life of the Honey Bee," by C. Easto, Esq., Lecturer on Apiculture to the Hants County Council.

Mr. Easto's paper was full of interesting and useful information.

The following combined excursions were held during the summer :—

May 4th. To Holdenhurst ponds and the Stour River at Throop.

June 18th. Dredging in Swanage Bay.

Aug. 10th. To Ober Water, in the New Forest.

The May excursion was spoilt by cold and wet. The district is really good hunting ground and the good results which might have been expected were interfered with by floods. As it was, Diaptomus Castor was found in fair abundance, and an attempt made to dredge the river at Throop resulted, among other things, in the finding of the larva of Simuliun in great quantities.

We regret that the dredging expedition on June 18th was so poorly attended, as this proved to be much the best and most interesting excursion. Tow netting yielded very satisfactory results, the Zoea and Megalope stages of the harbour crab, Cydippe and numerous Medusæ being captured, and many fine hydroids, sponges and ascidians were also obtained.

The Ober Water excursion was somewhat disappointing from a Zoological point of view, although some interesting specimens were obtained. July is really a better month than August for Ober Water, but this month was interfered with by the Bournemouth Centenary Fetes. Dr. Thomas was, however, successful in finding in a pool near by, the Polyzoon Fredericella, which is rare in this neighbourhood.

BRITISH MUSEUM
NATURAL HISTORY

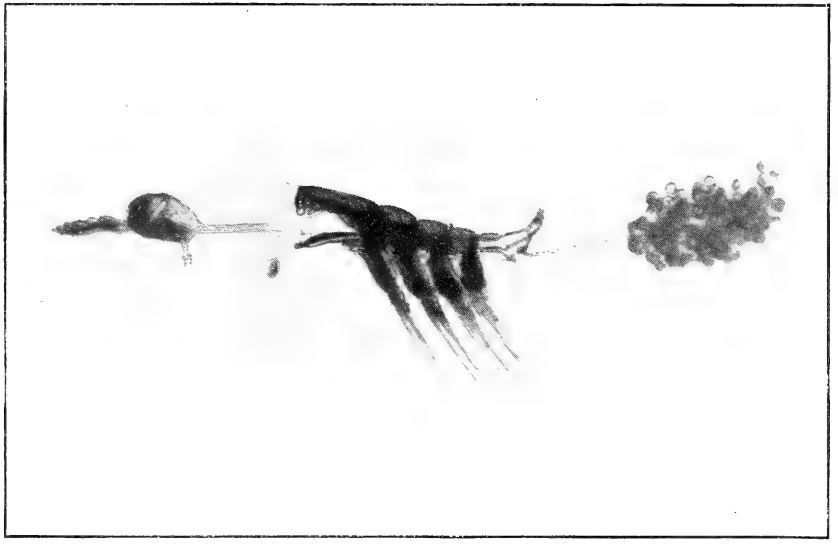

PLATE II.

Monstrilla. Thaumaleus Claparedii, carrying extruded ova.

In ast year's proceedings an illustration was given of one of the rarer Copepoda, Monstrilla Anglica. The interesting feature of this was that it was carrying the extruded ova, a condition seldom met with. The specimen did not produce a very satisfactory illustration, as it was dead when found.

Although the Monstrillidœ are rare, several were found in the tow net used off Bournemouth Pier in the months of April and May. In April Monstrilla Anglica was prevalent, but none carrying ova were obtained. In May, as these disappeared, a few of the other British species, Thaumaleus Claparedii, were obtained. Among these was one carrying extruded ova. As this was alive and vigorous, a much better mount of it could be made, and this has been very satisfactorily photographed by Dr. Dixon. The actual size is about 3-32 of an inch.

The frontispiece of the present volume of proceedings is from a photograph of a series of ecdyses of the common shore crab, Carcinus Mœnas. This series is now in the society's museum.

Dates and (approximate) measurement of the ecdyses taken across the greatest breadth of Carapace.

	Millimetres.		Millimetres.
Sept. 16, 1902 ...	1.5	July 10, 1903 ...	6.75
Oct. 16 ,, ...	1.75	Aug. 1 ,, ...	9
Nov. 6 ,, ...	3	,, 28 ,, ...	13
Dec. 2 ,, ...	3.75	Oct. 9 ,, ...	15.50
Jan. 10, 1903 ...	4	Nov. 17 ,, ...	21.50
Feb. 26 ,, ...	4.75	Feb. 12, 1904 ...	29.50
April 12 ,, ...	5.25	May 19 ,, ...	35.25
May 9 ,, ...	6	Sept. 14 ,, ...	41.50
June 10 ,, ...	6 50	July 15, 1905 ...	49 died.

This series represents the growth from what is known as the first Megalopa stage to the full grown crab.

The previous stages to the Megalopa are known as Zoœa, and bear little resemblance to the adult crab. The larva leaves the egg in the Protozœa stage, and almost immediately casts its delicate skin, emerging as a Zoœa.

There are four Zoœa stages recognized, produced by successive moulting. At the fourth moult a much more crab-like animal emerges —the Megalopa, and it is from this stage that the series commences.

H. J. Waddington.

Photographical Section.

CHAIRMAN: E. W. BARLOW, ESQ. F.R.A.S.

Opening Meeting of Session.

The first meeting of the winter session was held in Granville Chambers, on November 25th, 1909, when a lecture was to be given by C. J. Hankinson, Esq., who was the Chairman at this time, on "Some aspects of Modern Photography," illustrated by special lantern slides. In the unavoidable absence of the author of this paper, it was read by R. Y. Banks, Esq.

It referred largely to the illustrations thrown on the screen, which ranged from the work of Robinson and Horsley Hinton down to that of Arbuthnot and Coburn, and pointed out the growing tendency to divide photography into three very sharply defined schools. First, the school which devotes itself to record and scientific work, distinguished by the perfect technique and detail of the results; secondly, the school of photographers who are the merest amateurs and leave everything but the pressing of the button to other people; and thirdly, the school of pictorial photography pure and simple, which aims at impressions rather than actuality, and whose work is chiefly distinguished for two things—the sacrifice of actual truth to artistic effect, and the amount of work which is not photographic at all appearing in their prints.

The lecturer dwelt on the usefulness both of the first and last, but expressed the opinion that coming generations would owe a greater debt to the work of the men who, possessing the knowledge of composition and the value of light and shade, yet reproduced actual scenes as they saw them. A talk on the arrangements for the winter programme followed.

Bromoil Process and its Latest Modifications.

On Feb. 3rd, 1910, an interesting demonstration was given by E. W. Barlow, Esq., on "The Bromoil process and its Latest Modifications," About 40 members were present. This process is one of the two twin pigment processes which have come into such prominence and favour during the last few years on account of the variety of effect obtainable and the great possibilities of personal control. The results of both are almost identical, the difference lying in the purely photographic procedure giving the gelatine relief, which is afterwards inked up by means of special brushes and oil pigment akin to lithographic and printing ink. The oil process consists of direct printing under a negative on paper coated with gelatine and sensitised with potassium dichromate, then washing out the dichromate and at the same time swelling the relief. The bromoil process starts from a bromide print or enlargement which is bleached in a special bath and afterwards treated to weak sulphuric acid and hypo solutions. After washing, the print is ready to be inked up as in the case of the oil print. Practically no image can be seen; the print is laid on a pad of wet blotting paper and the

surface water removed with a damp cloth. Inking is done by vertical tapping strokes. There are several kinds of touch, and very many methods of controlling the image, introducing accentuation, eliminating detail, etc., are possible. The simplest one is overinking a part which is required darker than a 'straight' print would give or underinking when it is required lighter. Although there is so much scope for individuality in the process, it has its uses even for purely record photography. When inking is complete the print is hung up to dry. Any hairs or dust adhering to it may then be removed with a needle. A number of members expressed their determination of trying this fascinating process.

The Chairman, Mr. Hankinson, having resigned, Dr. Dixon proposed Mr. Barlow for election to the office and the matter having received an affirmatory vote from the meeting, he was elected by the Committee in due course.

The Renaissance of Stereoscopy.

On Mar. 3rd, R. Y. Banks, Esq., read a paper on "The Renaissance of Stereoscopy," about 35 members being assembled. The historical aspects of the subject were first touched upon in this interesting lecture, starting from the explanation of the theory of binocular or stereoscopic vision given by Euclid over 2000 years ago. The stereoscope was invented by Wheatstone in 1838, before the invention of photography. Mr. Banks briefly explained the theory of the subject and showed that the stereoscopic camera with its two lenses and dividing septum is a replica of the human optical system, the septum of which is formed by the bridge of the nose. The revival of stereoscopy of late years is chiefly due to the improved lenses and printing processes available. As regards the photographic side of the work, soft negatives should be aimed at. The uses of stereoscopy in scientific work were touched upon and the whole was illustrated by some fifty beautiful transparencies and a number of prints, the majority of which were the work of Mr. Banks. Afterwards Col. Markwick and Mr. Barlow showed some astronomical stereograms. That of the latter consisted of two of his photographs of the solar eclipse of August 1905, taken at an interval of some minutes. The resulting displacement of the moon caused it to appear to stand forward in front of the sun.

Photo-Micrography.

On April 21st, Dr. Dixon gave a demonstration of "Some Simple Methods of Photomicrography." Eighteen members were present. He pointed out the obvious advantages of the photographic method over drawing, and also the great fascination of the subject, as the worker is brought into contact with some of the most beautiful of nature's handiwork. Dr. Dixon showed an apparatus of his own design and construction with which much satisfactory work has been done and after explaining it in detail, he exposed and developed an excellent negative of sponge spicules. In order to obtain the best results in the more advanced and difficult branches of this pursuit, much time and earnest attention are necessary and suitable apparatus required.

One of the chief difficulties is that due to vibration; if much traffic pass the house, exposures are best made late at night. Orthochromatic plates should be used because of the more correct colour values obtained and also for the reason that sharper results are got with the objectives in general use, which are not corrected for photography.

Photographic Excursions

The first of the summer excursions devoted exclusively to photography took place on May 21st, when five members went in the morning to Corfe Castle. The party was conducted by the Chairman. It was a dull day but a few good negatives were secured in spite of the weather, which was hardly suitable either for record or pictorial work. An excursion to Brockenhurst and Boldre was arranged for June 11th, but owing to bad weather it was postponed. A combined Archæological and Photographical excursion took place to these parts of the Forest, under the conductorship of G. Brownen, Esq., F.C.S., on Aug. 31st.

The Portfolio has continued to circulate throughout the summer months and will do so in future. It affords much scope for mutual discussion and improvement. At the time of writing it possesses 17 contributors. Any other member who would like to join is requested to apply to the Chairman, at Ditton Lodge, Stourwood, Bournemouth. A subscription of one shilling per annum is charged.

Physical Section.

CHAIRMAN: HUBERT PAINTER, ESQ., B.Sc., F.C.S.

During the Society's year 1909-1910, five meetings of the Physical Section were held at the Society's rooms and a largely attended excursion took place in June. The Chairman gave a lecture at a General Meeting of the Society on "The Chemical Analysis of Solutions." A report of this appears on another page.

Atmospheric Electricity.

The first meeting of the section was held on Nov. 6th, when Dr. Mahomed gave a lecture on the above subject. The lecturer described the methods and some of the results of his experiments on the variations of the electrical potential in the atmosphere, prefacing his remarks by a brief historical sketch of the subject, and by a summary of the results obtained by various observers. Irregular and capricious as the variations of atmospheric potential appear to be, distinct evidence has been obtained of an annual and a diurnal cycle of changes. There are two daily maxima which appear to be dependent upon, although they do not coincide with, the times of sunrise and sunset. The winter readings are higher than those obtained in summer. The lecturer exhibited the electrometer with which his observations had been made and various diagrams were

shown upon the screen illustrating some of the more important of his experiments. Dr. Mahomed had attempted to find the nature of the connection between the electrical state of the atmosphere on the one hand and the varying conditions of temperature, barometric pressure, sunshine, storm, wind, etc., on the other. Thus far the positive results had been few, but the lecturer announced his intention of continuing his observations. An audience of about 50 listened with much interest to a story of personal work systematically carried out in a field of scientific research of which so much still remains unexplored.

Practical Applications of Electricity.

On Dec. 4th, Edgar L. Ingram, Esq., M.INST.E.E., gave a lecture on Electricity as a source of Heat, Light and Power. The lecturer, who is the Chief Engineer of the Bournemouth and Poole Electric Supply Company, gave an able exposition of so much of the subject as could be compressed into the limits of a single discourse. Starting with the chemical potential energy of coal, an account was given of the various transformations of this energy, and of the means taken and machinery employed to bring about these transformations.

Particularly good was Mr. Ingram's treatment of the interesting subject of the incandescent electric lamp. A sketch of its history and gradual development was given and the process of constructing lamps was fully explained. The interest of the lecture was greatly enhanced by the liberal display of electrical appliances for which Mr. Ingram had arranged and by the experiments performed in illustration of the principles and processes described. After the lecture, E. W. Barlow, Esq. F.R.A.S., read a short note announcing that he had already seen Halley's Comet. About seventy members of the section were present.

Meteorology.

The third meeting of the section was held on Feb. 5th. The lecturer was C. Dales, Esq., F.R.MET.SOC., the Borough Meteorologist, who gave his discourse the title, "The Weather, and Instruments for indicating the same." The lecture was illustrated by diagrams, and there was a considerable display of meteorological instruments on the table and about the room. The lecturer described various types of barometers, beginning with the simplest form of the instrument and ending with the standard pattern of Fortin. The methods of taking observations were described and an account given of the various corrections that are applied. Amongst the instruments exhibited was a recording aneroid barometer which still gives reliable indications after being in the lecturer's possession for 25 years. Charts showing isobars were displayed and the use of barometric readings in compiling weather forecasts was explained. Hygrometry was next dealt with and various forms of hygroscopes and hygrometers described and exhibited.

In treating of the direction and force of the wind an anemometer of the lecturer's own invention was shown to the audience. Temperature received a due share of attention and numerous thermometers were shown and the special purpose of each was

pointed out. The audience was particularly interested in Mr. Dales' remarks on sunshine recorders and examined the instruments and records shown with close attention. Dew and rain were considered and an automatically recording rain-gauge was shown. The lecturer concluded his discourse with some general remarks on the usefulness of Meteorology.

Several members took a share in the discussion which followed the lecture.

Electric Traction. On March 14th, Chas. W. Hill, Esq., General Manager of the Bournemouth Tramways, gave a lecture on "The Principles of Electric Traction, with special reference to the Bournemouth System." The lecturer traced the history of tramways from the earliest period and showed some interesting lantern slides of early forms of tram-cars and of tramways in out-of-the-way parts of the world. Other slides showed recent developments in electric traction, or special features in the Bournemouth system. Mr. Hill described how the electric energy required for the Bournemouth system is generated, distributed and controlled, and gave an account of the special local difficulties and how they have been surmounted. His description of the diseases to which tram-rails are subject, and of the remedies appropriate to such diseases, was very interesting.

Many statistics were given and it may in years to come be of interest to find it recorded that at the date of the lecture there were 29 miles of tracks, that 14,000,000 passengers were carried annually and that the car-mileage amounted to 1,800,000 per annum.

Nitrate of Soda and Iodine. The last lecture of the session was given on April 30th, by Vice-Admiral Castle, J.P. The lecturer described his visit to the city of Iquique and to the vast deposits of Nitrates in its neighbourhood. Every stage in the collection and preparation of Sodium Nitrate and of Iodine was fully described, and a general account given of the scenery and climate of the remarkable region in which the deposits occur. Actual specimens of the crude materials and the manufactured products were handed round and a number of diagrams, maps, etc., shown on the screen. Experiments were also performed, illustrating the way in which Sodium Carbonate is made from the Nitrate for use in certain of the processes, also the method in which Iodine is liberated from the Sodium Iodate which occurs in small and varying proportion in the "Caliche."

Visit to the Generating Station, Bournemouth Tramways. By the invitation of C. W. Hill, Esq., General Manager, the Physical Section visited the Generating Station of the Municipal Tramways on June 9th. About 50 members were conducted over the works by the General Manager and the Electrical Engineer, I. Bulfin, Esq., B.A. The operations carried on in the various departments were fully explained and at the conclusion of the inspection Mr. Hill kindly entertained the visitors to tea in the Employees' Recreation Room.

NATURAL HISTORY

PLATE III.—Illustrations of the Growth of the English Language.

The above represents three of the 36 slides illustrating Mr. Wood's lecture.

A Selection from the Papers read before the Society.

The Growth of the English Language.

By Samuel Wood, Esq., F.C.A.

Lecture delivered viva voce, 29th January, 1910.

The lecturer having been introduced by Colonel E. E. Markwick, C.B., F.R.A.S., proceeded at once to remark that his subject could not quite be considered "popular," in the ordinary sense of the word, although he thought it should prove interesting to the members of the Bournemouth Natural Science Society. Of course, in an hour or so one could only get a superficial view of a very wide subject.

The science of language, he said, brings us to the secrets of thought which have lain hidden in the dark chambers of the ancient labyrinth of language, and shows us the intricate passages of the human mind as they are encased in the words which have come down to us. Language consists of certain material elements or roots, with prefixes, suffixes and infixes. These roots are conceptual and capable of almost infinite expansion. The etymological meaning of every word shows us the first intention with which the word was originally framed. For instance, how does *moment* come to mean *this present time?* Momentum, movimentum, movere, in Latin meant *motion*, and referred probably to the shadow across the sun-dial. But momentum also meant the weight which makes the scales of the balance move, which was therefore a matter of importance, decisive, momentous.

The growth of our thoughts has, therefore, been historical and continuous, and words which seem to us modern, belong to the very granite of our thoughts, speaking in a geological analogy. Language is the vehicle of thought. It is the kingdom of conception and thought. It is the means by which Reason can make herself understood. As seed finds its expression in flower and fruit, so Thought expresses itself in words. The ancient Greek conception of language and thought was comprised and expressed in the one word Logos. The modern philosopher, Max Müller, declares that thought and language are identical—for without a name we should not be able to distinguish one thing from another. It has been said by Ruskin that in science you must not talk before you know; in language you must not talk before you think. The lecturer dwelt on the importance and necessity of using words in their right place and right sense—for by the omission of such an

obvious common-sense course we are often compelled to call in the lawyer and the Appeal Court to construe even the meaning of an Act of Parliament.

Our language, as we use it now, is in its prime. It was in its manhood in the reign of Queen Elizabeth. It was in its infancy at the time of the Norman Conquest. But what of its birth and parentage?

Aided by a series of excellent lantern pictures, many of which were prepared by his own hand, the lecturer now conducted his audience along the line of language development, commencing 7,000 years ago with Babylonia. Here was a people highly civilized who had their legal documents, foreign correspondence, title deeds, sales of slaves, marriage settlements, historical records, money-lenders' bonds at 25 per cent. (!), leases, private letters, and what not, all impressed indelibly on tablets of baked clay. In fact we are now digging up their thoughts put into writing ages ago. Then we pass to the Phœnicians, and then to the hordes of fierce Scythian horsemen from Asiatic Tartary, who over-ran Europe in the early ages. Then to the Gomerians, the Celts and Gaels, and so to the first landing of the Roman Legions in Britain. Father Time eventually swept the Romans away, and the Britons were left, struggling against Picts and Saxons. They were supplanted by a new nation and a new language—a people of Teutonic race whose tutelary deity was Odin. So we of the present day are the result of a long train of ebbings and flowings of the tide of human life, and these are most certainly reflected in our language.

All the words in all the Indo-European languages can be traced to some 800 roots, or elements. As an example, the root Pas was dealt with, meaning in primitive days the act of tethering or making fast. So we have Sanskrit pasu, and Latin pecus, meaning cattle. Now cattle signify one's private property, and we pass on to peculiar and pecuniary. The Greeks used the root in the idea of "standing fast," so extending to solid, curdled, and to any raised surface, in fact pagos, a mound, as in Areopagus, the mound or hill of Ares. The root blossoms out into the Latin forms pacare to pay, pignus a pledge, pagina a page, propago a layer, etc., etc., etc. In German we come to fah or fang. Thus fahen is to catch, but also fangen, from which gefangen, captured, and gefangniss, prison. Thus we see the variety of branches into which the primeval root may and does develop.

Again the lecturer made quite a history from Max Müller's account of that useful word "respectable." It is of Latin origin. Striking off the preposition we get spectare, or spicere, meaning to look. In Sanskrit we have spasa, a spy; old German spehon, to look, a spy. In Greek the root spek is changed to skep as in skeptomai, I look, examine, skeptikos an examiner, a skeptic, episkopos, an overseer, a bishop.

Respectable originally meant a person who deserves respect, who deserves a look back after we have passed. In Norman times a criminal received so many days *ad respectum*, to re-examine the case.

In fact we have not the space to go into all the branches of this root given by the lecturer, but may simply mention them, such as spite, spiteful, suspicious, circumspect, inspect, aspect, prospectus, expect, auspicious and speculate.

Many very interesting slides were now exhibited, which we can only refer to somewhat briefly. A Babylonian tablet B.C. 4500, character semi-pictorial. The famous black obelisk inscribed with an account of the Wars of Shalmaneser II., King of Assyria B.C. 860. Then we saw the writing of the ancient Britons, viz., letters cut with a knife upon sticks. Then was shown a specimen of Irish Ogham, or Cypher. Now we come to the language spoken in Saxon England, viz., Anglo Saxon. A specimen of King Alfred's translation of the Lord's Prayer was shown in the native Saxon character, which the lecturer read and explained. Following this were visual pictures of a portion of Alfred's translation of a work of travel and of the Saxon Chronicle (A.D. 1100). Now came the Norman Invasion, and of course a new language grafted on to the old. The upper classes spoke and read French, and the old literary Saxon language ceased to be written. But the people still continued to speak the common or vernacular tongue, in which the grammatical inflexions were neglected, and thus preserved the germ of our speech in its simpler forms. For although the Normans gave us rulers, they did not give us a people. The people remained English, and within 100 years after the Conquest the nation became amalgamated; and a distinct type of people emerged which has never had its like in any age of history, and the powerful originality of which eight centuries have only served to deepen.

The changes brought about by the introduction of French chiefly affected the vocabulary. Thus, when the Saxon farmer took his meat for sale to the Norman castle, he had to imitate the Frenchman and call it beef, mutton, and pork, while the names familiar to himself were oxen, sheep and pig. "Dinner" and "Supper" come from the French, while "Break-fast" is native Teutonic.

An extract from the Chronicles of Layamon showed an advance, or transition from the old Anglo-Saxon to a more modern language; this was followed by an extract from Robert of Gloucester, first half of fourteenth centuary. Then came an early version of the 16th Chapter of St. Luke, from the Wycliffe Bible. Next followed Chaucer, and then some writing by Caxton, and so we followed on to the "spacious times of great Elizabeth," with Spenser, Ben Jonson, etc. An interesting picture was that of the title page of the Psalter printed in 1583 by John Day. This is a rare work, not found in the King's Library at the British Museum. Then we saw the Te Deum of St. Ambrose, with Gregorian music printed in type. It may be said that the English Bible has done more for the preservation of purity and propriety of utterance in our speech, than any other agency.

And now-a-days, we note the enormous extension of our language over the face of the globe. Lord Morley has said, "I know not in the history of mankind a more stupendous, a more overwhelming fact,

than the supreme dominance of the English tongue over millions in the new worlds of the West and in the ancient worlds of the East." If ever English becomes a world language, it will depend on whether its inheritors elevate and maintain its character and *are strong enough to uphold and extend its sway.*

A picture of a page of Ruskin's type, with alterations by that great writer, by permission of his publishers, showed how carefully and minutely he weighed the value of each word, and each turn in a sentence.

The lecture, which throughout, was of a deeply intellectual and thoughtful character, was listened to with the greatest attention, and the Chairman, in proposing the usual vote of thanks remarked that he did not know which to admire the more, the immense stores of erudition possessed by the lecturer, or the skilful manner in which he communicated his knowledge to the audience.

Sopley Church.

A lecture delivered before the Archæological Section, 24th Feb., 1910, by the late A. Scott, Esq., B.A., Hon. Librarian.

[This lecture was selected for publication in the "Proceedings," but Mr. Scott's deeply regretted death has prevented his supervision through the press].

THE pretty village of Sopley, on the Avon, lies nearly midway between Ringwood and Christchurch. On approaching its famous old church, one is struck with the peculiarities of the site—an artificial mound thrown up near a branch of the Avon, on which stands an ancient mill with eel traps mentioned in Domesday 800 years ago! Many of our local archæologists, of which the late Mr. Shore may be quoted as typical, regard these church mounds, which are of frequent occurrence in Hampshire, as indicative of Celtic origin. If so, a Pagan temple may have stood on the mound, which the early Christian missionaries re-adjusted and converted to their use. So the wargod of the Pagan was deposed and the warrior angel St. Michael made the patron of the new era. This and much more may be possible, but we must say that every reliable trace of pre-Norman work, if it ever existed, has completely disappeared—Celt, Roman, Saxon and, we may add, Norman, have vanished with the ages. Legends and traditions exist of battle—a coin of Vespasian was found some years since in Sopley Park—a lane running from the Forest to Sopley is called Derrit Lane (Dane route lane?)—and the Sambucus ebulus or Danewort has been found there, etc.

That a church in the Saxon period existed at Sopley is, however, certain, for a Norman charter recites that Orricus took away some lands from Sopley Church and gave it to Twynham. Of the

Norman church which succeeded the Saxon, only a few doubtful pieces of masonry remain worked into the church which still exists, but a charter of Richard de Redvers executed betwixt 1100 and 1107 distinctly confers Sopley Church on Twynham Monastery, and this first deed of gift was confirmed by successive de Redvers, Earls of Devon, etc., and the living was amongst the properties surrendered to Henry VIII by Twynham Priory at the dissolution in 1539.

Before, however, proceeding to an examination of the interior of the building, we must just glance at its outside. We have here obviously a cruciform church with a nave, chancel, transepts and a west but no central tower. We again notice the buttresses of the nave are many and strong for so small a church, the western ones being placed diagonally at the corners—a feature not found before the 14th century. From these and other structural peculiarities of the roof and the central (inside) columns, we expect that the central tower either collapsed or had to be taken down at an early date to prevent destruction of the entire church. The north porch is the chief entrance, and over its arch in a niche is a figure of St. Michael holding a staff or spear and apparently standing on a corbel head. There is no trace of a dragon under the saint of church dedication, so it probably indicates St. Michael in victory. The western tower is of the Perpendicular type and is surmounted by a low timbered and slated spire. On the east and north gables are two ancient crosses (of an older church?) Entering the church by the north porch, wall paintings and frescoes are seen. Over the south door the faded figure of St. Christopher and the infant Christ may still be traced, and in the nave and north transept relics of inscriptions and paintings indicate that Sopley had an ancient polychromatic church.

In the nave the pillars are octagonal and standing on square plinths with capitals of rounded and simple mould. A rood loft formerly existed between the east piers of the crossing, and traces of access to it still remain and portions of the old screen are said to be preserved in the reading desks. The ancient wooden roof of the nave was cleared from its ugly plaster ceiling in 1868, and it was then seen to be a trussed roof and an excellent example of 15th century work. The wall posts of the nave roof rested on corbels—two of these representing members of the angel choir still remain, one playing the double pipe and the other the viol. There are also two mutilated corbels supporting the arch leading from the north aisle into the transept. These have been supposed to represent Edward II or III and their Queens, but they do not correspond with their effigies in other places and being uncrowned may be manorial personages associated with the church. The north transept was an ancient chapel, and in the south transept was and still is an excellent hagioscope. The pulpit is Jacobean and bears the date 1604. On entering the chancel we notice in the south wall a low side window or lynchnoscope—one of the great puzzles in ecclesiastical archæology. Its use is said to be either for the relief of travellers or lepers, for ventilation, for the ringing of the sanctus bell, doles to the poor, etc.

The restored east window of the church contains some ancient glass of heraldic importance. This glass exhibits the arms of Berkeley charged with the mark of cadency, and refers to Thomas Berkeley, who died in 1522. On the opposite side of the shield is the cross saltire of the Nevilles, indicating his wife as Elizabeth Neville, daughter of Lord Abergavenny; and her ancestral descent is displayed as through the baronial families of Clare, Despenser, Warwick and Beauchamp. The Berkeleys were seated in the neighbourhood in the 14th, 15th and 16th centuries, and must therefore be associated with Sopley Church during this important period of its history. A daughter of the Berkeleys in the earlier half of the 16th century married Sir W. Compton, and so the flaming cresset of the Comptons is also emblazoned at the side of the Berkeley shield as nearly contemporaneous in time.

On the floor under the present tower of the church are laid two effigies in Purbeck marble under canopies of the Decorated period, and near them a stone coffin lid of an ecclesiastic with a cross upon it. These memorials have probably been removed from the east to the western end of the church. Ancient altars dedicated to the Holy Trinity, the Virgin, and St. Michael were within the church.

Besides the families of Berkeley and Compton of ancient times, the families of the Powletts, Stourtons, Willis, etc., have been associated with its history. To the last-named family an interesting and significant tablet in the church bears witness—Sir George Willis, G.C.B., Commandant at Portsmouth for many years. His memorial tablet is draped by two old flags and bears the following words—"Not far away a boy was born to fair prosperity, then entering in the world's rough race he won at length a foremost place and then he died."

On the south side of the church, in the churchyard, is the tomb of General Lord Keane, the hero of Afghanistan, a soldier of Anglo-Indian fame who has chosen this quiet spot for his long rest. Standing near his tomb on one of our last visits, with the Avon flowing placidly below and the wintry sun setting behind the pine-clad hills of St. Catherine with the noble Priory at Christchurch silhouetted against the southern sky, one felt that this quaint old church at Sopley, standing on its older mound, possessed elements of interest and beauty difficult to surpass—even in Hampshire.

Recent Additions to the Fungus-Flora of the New Forest.

By J. F. Rayner, F.R.H.S.

SINCE the publication, in 1904, of the "List of the Fungi of the New Forest," the following additional species and varieties, to the number of over 100, have been recorded. Some of them, it will be observed, are of considerable interest and importance. The credit is largely due to the annual forays of the Hants Field Club, the Bournemouth Natural Science Society, and the Southampton Rambling Club.

FUNGI.

Cyathus striatus. Hoffm.
Near Brockenhurst.

Thelebolus terrestris. A. and S.
Ironshill Inclosure.

Lycoperdon echinatum. Pers.
Near Blackwater.

atropurpureum. Vitt.
Holmsley.

excipuliforme. Scop.
Denny Lodge Inclosure.

cepaeforme. Bull.
Near Blackwater.

Pilacre Petersii. B. and C.
Woodfidley.

Tremella fimbriata. Pers.
Denny Lodge Inclosure.

frondosa. Fr.
Church Place Inclosure
Rhinefield.

lutescens. Pers.
Holland Wood.

Sparassis crispa *var.* laminosa. Fr.
Holmsley.

Clavaria formosa. Pers.
Near Hangersley.

argillacea. Fr.
Denny Heath.

Soppittiella sebacea. Mass.
Hurst Hill.

Hymenochaete rubiginosa. Lev.
Busketts.

corrugata. Lev.
Holmsley.

Corticium caeruleum. Fr.
Bolderwood.

Stereum multizonatum. B. and Br.
Denny Lodge Inclosure.
Perry Wood Inclosure.

Solenia anomala. Fr.
Ironshill.

Hydnum ferrugineum. Fr
Burley New Inclosure.

Phlebia radiata. Fr.
Mallard Wood.

Daedalea confragosa. Pers.
Holmsley.

Trametes rubescens. Fr.
Denny Lodge Inclosure.
Rhinefield. Nr. Beaulieu River.

Polystictus perennis. Fr.
Wootton Inclosure. Holmsley.

Fomes igniarius *var.* pomaceus.
Bratley Wood, etc.

Polyporus squarrosus. Fr.
Wootton.

elegans. Fr.
Pine-wood near Palmer's Water.

crispus. Fr.
Near Blackwater.

borealis. Fr.
Mark Ash.

alutaceus. Fr.
Mallard Wood.

Boletus fragrans. Vitt.
Ironshill Inclosure.

versipillis. Fr.
Denny Lodge Inclosure
Ironshill, etc.

Psilocybe physaloides. Bull.
Denny Lodge Inclosure.

Hypholoma hypoxanthus. Phil. and Plow.
Denny Lodge Inclosure.

Stropharia stercoraria. Fr.
Denny Lodge Inclosure.

Paxillus paradoxus. Cke.
Denny Lodge Inclosure.

FUNGI—continued.

CORTINARIUS (PHLEG.) TRIUMPHANS. Fr.
Denny Lodge Inclosure.

DIBAPHUS *var.* XANTHOPHYLLUS. Cke.
Near Race Course.

EMOLLITUS. Fr.
Nr. Lyndhurst Road Station.

(DERMO.) SPILOMEUS. Fr.
Near Knightwood Oak.

COTONEUS. Fr.
Denny Lodge Inclosure.

(INO.) ARGENTATUS. Kromb.
Nr. Lyndhurst Road Station.

PHOLIDEUS. Fr.
Near Burley.

FLAMMULA SPUMOSA. Fr.
Holland Wood.

GALERA LATERITIA. Fr.
Near Rhinefield.

INOCYBE HYSTRIX. Fr.
Denny Lodge Inclosure.

SCABER. Fr.
Burley.

RIMOSA.
Rhinefield. Wootton, etc.

EUTHELES. B and Br.
Holland Wood, etc.

PHOLIOTA MUTABILIS. Schaeff.
Denny Lodge Inclosure.

LEPTONIA LAZULINA. Fr.
Balmer Lawn.

PLUTEUS LEONINUS. Schaeff.
Mark Ash. Bratley Wood.

PELLITUS *var.* PUNCTILLIFER. Quel.
Denny Lodge Inclosure.

LENZITES FLACCIDA. Fr.
Rhinefield.

CANTHARELLUS ALBIDUS. Fr.
Hincheslea.

LUTESCENS.
Nr. Lyndhurst Road Station.

CINEREUS. Fr.
Denny Lodge Inclosure.

HYGROPHORUS UNGUINOSUS. Fr.
Denny Lodge Inclosure.

LIVIDO-ALBUS. Fr.
Denny Lodge Inclosure.

PLEUROTUS ACERINUS. Fr.
Denny Lodge Inclosure.

ATROCAERULEUS. Fr.
Denny Lodge Inclosure.

OMPHALIA RUSTICA. Fr.
Denny Wood.

CLITOCYBE FUMOSA. Pers.
Ashurst Wood.

var. CAESPITOSA.
Church Place Inclosure.

GILVA. Pers.
Church Place Inclosure.

OBSOLETUS. Fr.
Ironshill.

LACTARIUS VIETUS. Fr.
Near Burley.

RUSSULA ALUTACEA. Fr.
Near Roman Arch.

ARMENIACA Cke.
Denny Lodge Inclosure.

LUTEA. Fr.
Ashurst.
Denny Lodge Inclosure.
Queen's Bower.

DENSIFOLIA. Secy.
Denny Lodge Inclosure.

CITRINA. Gillet.
Denny Lodge Inclosure.

OLIVASCENS. Fr.
Denny Lodge Inclosure.

SANGUINEA. Fr.
Denny Lodge Inclosure.

MYCENA TENERRIMA. Bert.
Millyford Bridge.

TINTINABULUM. Fr.
Ironshill.

FLAVOALBA. Fr.
Denny Lodge Inclosure.

COLLYBIA HARIOLORUM. Bull.
Denny Lodge Inclosure.

MARASMIUS CANDIDUS. Bolt.
Church Place Inclosure.

TRICHOLOMA EQUESTRE. Linn.
Ironshill.

SAPONACEUM. Fr. *var.* STIPITE SQUAMALOSO. Cke.
Rhinefield, etc.

LASCIVUM. Fr.
Ironshill.

CARNEUM. Bull.
Denny Heath.

ALBUM. Schaeff.
Denny Wood.

LEPIOTA RACHODES. Vitt.
Denny Wood.

GRACILENTA. Kromb.
Denny Wood.

CLYPEOLARIA *var.* PRATENSIS.
Denny Lodge Inclosure.

FUNGI—continued.

PHACIDIUM MULTIVALVE. Kze. and Schmidt.
Ashurst Wood.
Wootton Inclosure, etc.

ORBILIA LEUCOSTIGMA. Fr.
var. XANTHOSTIGMA. Rehm.
Mark Ash.

HELOTIUM CLAROFLAVUM. Berk.
Matley Wood.

PEZIZA VESICULOSA. Bull.
Near Hangersley.
AMPLIATA. Pers.
Ironshill Inclosure.

HYPOMYCES ROSELLUS. A. and S.
Ashurst Wood. Burley.

ACETABULA VULGARIS. Fckl.
Near Brockenhurst.

HELVELLA ELASTICA. Bull.
Ironshill Inclosure.
LACUNOSA. Afzel.
Holmsley.

GEOGLOSSUM GLABRUM. Pers.
Ocknel Arch.
GLUTINOSUM. Pers.
Holmsley Inclosure.

NECTRIA DITISSIMA. Tul.
Woodfidley.
AQUIFOLII. Berk.
Holmsley.

DIALONCETRIA PEZIZA. Tode.
Woodice.

CLAVICEPS PURPUREA. Fr.
Denny, etc.

CORDYCEPS ENTOMORHIZA. Fr.
Near Brockenhurst.

HYPOXYLON FUSCUM. Pers.
Ashurst Wood, etc.

XYLARIA POLYMORPHA. Pers.
Vinney Ridge.

RHYTISMA ACERINUM. Pers.
Holmsley. Denny.

DIATRYPE DISCIFORMIS. Fr.
Mark Ash.
QUERCINA. Fr.
Buskett's Wood.
Rhinefield, etc.

PHYLLACTINIA GUTTATA. Lev.
Common.

DICHAENA QUERCINA. Pers.
Ashurst.
FAGINEA. Fr.
Near Buskett's Wood.

AECIDIUM EUPHORBIAE. Pers.
Rhinefield.

Mycetozoa.

For the subjoined important additions to our hitherto scanty records of these remarkable organisms, we are largely indebted to the late Mr. Arthur Lister, F.R.S., Miss G. Lister, F.L.S., and Mr. J. Saunders, A.L.S.

BADHAMIA UTRICULARIS. Bull.
Mark Ash.

PHYSARUM COMPRESSUM. A. and S.
Lyndhurst.
STRAMINIPES. Lister.
CONTEXTUM. Pers.

FULIGO SEPTICA. Gmel.
Near Lyndhurst.

CRATERIUM LEUCOCEPHALUM. Ditm.
Near Lyndhurst.
MUTABILE. Fr.
Near Lyndhurst.

CHONDRIODERMA SPUMARIOIDES. Rost.
Near Lyndhurst.

DIDYMIUM CLARUS. Rost.
EFFUSUM. Link.
NIGRIPES. Fr.
DIFFORME. Duby.
FARINACEUM. Schrad.
All near Lyndhurst.

STEMONITIS FUSCA. Roth.
Near Lyndhurst.
SPLENDENS. Rost. *var.* FLACCIDA
Bolderwood.

MYCETOZOA—continued.

ENERTHENEMA ELEGANS. Bowm.

COMATRICHA OBTUSATA. Preuss.

PERSOONI. Rost.
Near Lyndhurst.

TYPHOIDES. Rost.
Vinney Ridge.

LAMPRODERMA IRIDIEUM. Mass.
Near Lyndhurst.

CRIBRARIA AURANTINCA. Schrad.
Near Lyndhurst.

DICTYDIUM UMBILICATUM.
Schrad. *var.* FUSCUM.
Near Lyndhurst.

RETICULARIA LYCOPERDON. Bull.
Rhinefield.

ARCYRIA PUNICEA. Pers.
ALBIDA. Pers.
var. POMIFORMIS.
FLAVA. Pers.
All near Lyndhurst.

LYCOGALA FLAVO-FUSCUM. Rost.
Mark Ash.

In addition to the above there is a large number of Fungi, for which only one or two localities had been recorded, that have since been noticed in other parts of the Forest, and some, indeed, found to be of very general distribution.

October, 1910.

My Experiences of New Guinea and its Wild Savages.

By JAMES E. LIDDIARD, ESQ., F.R.G.S.

Read 11th December, 1909.

NOTWITHSTANDING the unfavourable weather, a good audience assembled to listen to the very interesting lecture that was given by Mr. James E. Liddiard, F.R.G.S., the Chairman of the Geographical Section, entitled, "My Experiences of New Guinea and its Wild Savages."

Dr. Moorhead presided, and in calling upon the lecturer, said that he had always listened to him with much pleasure and profit. In opening his lecture, Mr. Liddiard said that he had enjoyed the advantage of travelling far from the beaten tracks, that he had experienced the delight that the sight of the world's wonderlands and of far-away islands always enkindles, that he knew something, too, of the keen gratification that inspires those whose privilege it is to look upon the comparatively unknown, and that he did not remember any part of the world where all this had been felt more deeply than in that of which he was about to speak. The lecturer said it had been his pleasure and his privilege on several occasions in past years to speak to the members of the Society of his travels in various parts of the world—in the Far North and the Far South, in the Far East and the Far West,—and he now had to ask them to accompany him to a comparatively recently acquired British possession, one of the youngest in the great family of the nation, and

one which, owing to its far-away position, to its trying climate, and to the wild character of its natives, has been far less seen than any other. New Guinea, or Papua—as it is henceforth to be called —is the largest and is one of the most beautiful islands in the world ; yet up to within the last few years it was a "terra incognita." Its position was described, and its first discovery was said to have been claimed both by the Portuguese and the Spaniards. It was called "Nueva Guinea" by the Spanish commander, Ortez de Retez, from the supposed resemblance of its inhabitants to those on the African Guinea coast. The Malays and the natives of other islands called it "Tanna Pua-pua," or "the land of the frizzly-haired people," and the term "Papua" is a corruption of this.

Dampier, the great maritime adventurer, voyaging in quest of new lands, sighted New Guinea, and never left it till he had sailed completely round it. He wrote a very racy account of the country and people, which was probably read by Defoe before he wrote "Robinson Crusoe."

The area of New Guinea is about 342,000 square miles, of which about 90,000 square miles is British territory, the Germans possess some 70,000 square miles and the remainder belongs to the Netherlands. The population of British New Guinea is estimated to be about 500,000, of the German portion about 220,000, and of the Dutch about 200,000.

British New Guinea was formally annexed in 1888, and in 1901 it became a dependency of the Australian Commonwealth.

Regarding its physical features, it is a country with magnificent mountain ranges ; these mountains and by far the larger portion of the lower country are covered with forest. From the mountain ranges come sweeping down to the coast large and numerous rivers, chief of which is the great Fly River, the largest south of the Line, and the main highway into the interior. These great rivers and innumerable smaller streams cut their way from the uplands across wide plains that stretch to the sea, covered with vegetation of tropical luxuriance so closely grown as to be almost impenetrable.

There are no great beasts of prey in the country. The largest indigenous animal is the wild boar. During recent years considerable explorations have been made, but there still remain large areas in the interior that have not yet been reached—the great mountain ranges doubtless contain many hitherto undiscovered treasures.

The difficulties attending travel in New Guinea are, however, many and great. First, as regards the wild rocky coast, which is subject to the force of strong and continuous monsoons during nearly the whole of the year. There are in consequence terrific seas to encounter, the breakers being usually so heavy that launching or landing are alike extremely dangerous, and it is almost impossible to do either without a thorough drenching. And travelling inland is not much better, for there are no roads. Anyone desiring to proceed from one district to another must tramp on foot under the blazing sun of the tropics, along the sea-shore, or through the bush,

and will seldom find any provision for crossing the numerous creeks and rivers on his way. There is also a fine assortment of venomous and dangerous creatures in this island. Sharks abound along the coast, alligators infest the creeks and rivers, snakes in abundance and of many varieties are to be met with all over the country, there are hosts of scorpions and centipedes about the houses, and lastly, but by no means the least in degree of annoyance, the mosquitoes must be taken into account, for these ravenous insects are a terrible plague and are the worst cannibals in New Guinea. Then there is the almost universal penalty of fever, which is of a severe character and is nearly everywhere prevalent. Regarding this, the lecturer said that when he was on his way to New Guinea he was told by some of his friends in Australia that he must take whisky. He asked why? and was told "on account of the fever." But as he had been told that everybody who went to New Guinea took fever, it was evident that the whisky was not of much value as a preventative. As a matter of fact, when he went to New Guinea he did not take whisky and he did not take fever. He said that should a man who is a total abstainer take fever, he was convinced that he is physically better fitted to resist its attacks than the man who is not, and that he is much less liable to other diseases.

The lecturer referred to the Courts which have been established, before which European and native alike may find equal and just treatment, and to the native force of armed constabulary, which is very popular. He said that the prison system has proved a most valuable school, in which the prisoner has been raised, and not lowered. Another difficulty attending travelling is the large number of different languages, with their multiplicity of dialects. Among them the Motu language is the most advanced, and illustrations were given of some very interesting expressions.

After referring to the beauty of the approach to Port Moresby, the harbour, the villages, and the surrounding country were described. Much was then learned of the men, their dress and decorations, and the costume and ornaments of the women; the process of tattooing was explained, and the arrangements for marriage were mentioned. Specimens of native architecture were shown, and in some of the villages it was seen that the picturesque effect of the graceful palms has been well utilised. In one picture was to be seen a marine village built out in the lagoon, and in another some of the houses which are constructed in the highest trees. Reference was made to the arrangements for burial and mourning. The weapons of the natives were mentioned and described, also their charms, and attention was directed to the manufacture of native pottery and to the various types of canoes. The method of harpooning the dugong was explained, also the way in which the natives shoot fish with their bows and arrows. Particulars were then given of a dangerous voyage with cannibal companions, also of a narrow escape from a shark. Explorations of several of the rivers were referred to, and the lecturer said it was impossible adequately to describe the beauties of the river scenery. Though New Guinea

is poor as regards animals, in birds it is exceedingly rich, and in brilliance of plumage its bird life stands unrivalled. Already some 770 different species have been discovered. To the entomologist, New Guinea is also of great value, as its insects vie in loveliness and novelty with its birds. Boys and girls, and their games, were described, and some of their names with their meanings were given.

The lecturer then referred to the noble mission work that has been done in New Guinea, and to the wonderful changes that have unquestionably been effected in the condition of large numbers of the natives, and said that successive Governors have borne most gratifying testimony to the incalculable value of this work.

In concluding, Mr. Liddiard expressed the hope that the particulars he had given of New Guinea and its people as he had seen them would enable his hearers to form some clearer ideas of this interesting island and its inhabitants, and would enable them to sympathise with those who are labouring in this far-off land for the enlightenment and the uplifting of its people.

The Chairman then said that he had much pleasure in moving that their best thanks be accorded to Mr. Liddiard for his excellent lecture, by which they had been both interested and instructed, and this was unanimously and very heartily carried.

The Association of some Dorset Place-Names with the History of the County.

By W. J. Stanton, Esq.

(*Read before the Geographical Section on 22nd January, 1910*).

In a former paper the classification of the Dorset Place-Names was dealt with from a geographical point of view. In the present one their connection with the history of the county will be considered, and it must be said at once, that a certain amount of difficulty is met with, owing to many of the names deriving one portion at one period and another later. Take, for example, the name Dorset. The district was at one time peopled by the Durotriges, who appear to have received their name (British *dwr* water, and *tre* a dwelling) because they lived on the borders of the swamp then formed by the River Frome. When the Saxons overthrew them and colonised their territory they named it Dorsoetas (Saxon *soetas*, settlements) and so the name is partly Celtic and partly Saxon. It may be mentioned in passing that Professor Rhys suggests that *duro* in Durotriges signifies a door or gate.

For the purposes of classification, the history of the County may be divided into Pre-Roman, Roman, Anglo-Saxon, Danish, Norman, and Post-Norman Periods.

Very few of the Dorset names are Post-Norman, showing that even our smallest villages existed at an early date. Churches, palaces and houses have decayed, and in many cases have been replaced from time to time, but the names of the places to which those bygone churches and other buildings were attached have survived, and we can therefore say that the place-names are more ancient than anything else in the county except the various earthworks and burying places which are so abundant.

Taking the periods before mentioned into particular consideration we will first deal with the Pre-Roman Period. None of the names go back beyond Celtic times and even these names are connected with the natural features rather than with settlements. Winfrith (*gwyn*, clear, *frut*, a stream), Kimmeridge (*cymmve*, a place of hills and hollows), Creech (a hill), Dorchester, Owermoigne, Blandford, Eggardun, Maiden Castle, Badbury (*bod*, a dwelling), Frome (*frou*, a river), Wey (*wye*, water), Trent (*trouent*, a winding river), Stour (*sdora*, water), Allen (*elaine*, a fawn), Pillesden Pen, Pentridge, Pembury Hill and Poole are names which wholly or partly belong to this period. Winfrith, which is entirely British in origin, is of special interest as two other names in the county of different derivations have the same significance. Wimborne is a hybrid from Brit. *gwyn*, clear, and S., *burne*, a stream, while Sherborne is pure Saxon from *sciva*, clear, and *burne*.

Very few names given by the Romans have come down to us, in fact, there is apparently not one name of purely Roman origin. We find only Dorchester, Bridport, Portland and Stratton.

On a close examination it is seen that the majority of the place-names date from Anglo-Saxon times. Wherever the syllables, burn, burne or borne, ford, well, mouth, abbas, comb, ton, wick, ham, worth, regis, and others are found, then we know we have names partly or wholly Saxon in character. A large number of such names in Dorset were dealt with in a previous paper and do not call for mention again here, but there are some worthy of more than a passing notice. We all know what an important position Wessex filled among the Saxon Kingdoms and how in course of time the others were subdued by it. Dorset was in the centre of powerful Wessex and it is therefore not surprising that the kings of that time had large possessions in the county and often visited it. Bere Regis was probably the site of a Saxon royal palace. Melcombe Regis, Lyme Regis and Wyke Regis were given by Saxon kings to religious communities at Milton, Sherborne and Winchester respectively, Lyme Regis being presented "so that salt for the said church (Sherborne) should be boiled there for the supplying of various wants," and it is quite possible that Melcombe Regis was given for a similar purpose as the deed of gift mentions a "saltern by the wear." Kingston, Kingston Lacy, Kinson (king's stone town), Winterbourne Kingston, Kingston Russell and Kingston

Magna were all royal manors. Kingston, which formerly included Corfe and the knoll on which the castle was afterwards built, came into the possession of Shaftesbury Abbey, and it is on record that William the Conqueror obtained, by exchange, from the Abbey, a piece of land in Kingston. Possibly this land formed the site of the castle.

Names with the suffixes -ton, -worth and -ham are plentiful. All are more or less of interest, but in a condensed paper of this description mention can be made of only a few. Athelhampton formerly belonged to Æthelhelm, one of the Saxon Earls of Dorset, who in 837, commanded the men of the county in an engagement with the Danes at Portland, where he lost his life. Warbarrow is a corruption of Worth Barrow. Hammoon is an abbreviation of Ham Mohun, the place having been given to William do Moion who came to England, with forty-seven knights, to assist the Conqueror, for which service he was rewarded with eleven manors in this county and fifty-five others in Devon and Somerset.

To increase the revenues of many of the religious houses grants of land were made in Saxon times. Winterbourne Abbas and many other places were given to Cerne Abbey, Stoke Abbas and Bradford Abbas to Sherborne Abbey, Shaftesbury received Compton Abbas and Melbury Abbas, while Buckland Abbas was bestowed on Glastonbury.

It will be as well to record here the history of the name Whitchurch Canonicorum. The place in Alfred's time was called Whitchurch after St. White, a martyr registered in the Roman Calendar by the name of Saint Candida, and in whose honour a church had been built there. In 1065 the Canons of Wells received the revenues of a part of the manor, but before 1215, either by gift or purchase, the church passed to the Bishop and Chapter at Sarum, In the reign of Henry III commissioners were appointed to settle the disposition of the revenues, and the Chapter of Wells was awarded one moiety and that at Sarum the other.

Most of the Saxon names survived the Danish invasions and there are few names belonging to the latter period. Swanage (Swain's wic) and Tolpuddle are the only two of note. Tolpuddle was the property of Tola, the wife of Orcus, the founder of the religious settlement at Abbotsbury and a great officer under Canute. Tola naturally gave the manor to Abbotsbury, to which place it belonged when Domesday Book was compiled.

The Norman Conquest brought a change of ownership in the case of a great many places in Dorset, William giving the various manors to Norman religious houses or his Norman favourites. In 1064 William had founded the Abbey and Church of St. Stephen at Caen and to it, after the Conquest, he gave Winterbourne Came (corruption of Caen), Bettescombe, Bincombe, Burton Bradstock, and Frampton. The Priory of Le Vast, near Boulogne, received Winterbourne Monkton, the Monastery of St. Mary Villaris, in the Diocese of Rouen was given Friar Waddon, Stour Provost became the property of the Nunnery of Preaux or Preveaux, in Normandy,

while lands at Blandford St. Mary passed into the hands of the nuns of St. Mary, Clerkenwell. As regards William's gifts to favourites, a certain knight named Hugh Fitzgrip frequently appears in old records as a landowner in the county, and his wife had considerable property in her own right, but neither has left behind a place-name to mark his or her connection with either of their manors. Amongst those who came from Normandy were the Heryngs and from them we derive Chaldon Herring, Langton Herring and Herringston. De Caieneto gave names to Tarrant Keyneston and Coombe Keynes, the Mautravers to Lytchett Matravers, Langton Matravers and Worth Matravers, Waleran, the king's huntsman, to Sutton Walrond, and Baldwin the Sheriff, to Shroton, an abbreviated form of Sheriffstown. Wynford Eagle formed in Norman times a part of the barony of Aquila, in Sussex. Kingston Russell was given to the Russells who are supposed to have come from Rosel, in Normandy. It has been held at various times for curious services. Edward I granted it for the service of cupbearer, while a charter of Edward III is in existence which states that "the Manor of Kingston Russell is held of us by service of counting our chessmen in our chamber and putting them in place when we have done playing."

Few names given in Post-Norman times are of great historical interest. The Knights Hospitallers owned Toller Fratrum, Friar Mayne and West Knighton, and at the last-named place there was a preceptory. Bryanston was held by Brian de Lisle, who became Sheriff of Yorkshire, Turner's Puddle (Toner's Puddle) by the Toneres who on many occasions represented Dorset in Parliament as knights of the shire, Bradford Peverel by the Peverils, and Hinton Martel by the Martels. Bryan's Puddle received its name from Brian de Turbervil who was lord of the manor there in the reign of Henry III, about the same time Robert Bingham came into possession of Bingham's Melcombe, Sturminster Marshall belonged to the Marshalls, Earls of Pembroke, the Fitzpaines held Okeford Fitzpaine and Wootton Fitzpaine, while Melbury Sandford came into the hands of the Sanfords from whom it passed by marriage to the Strangways, to whose descendants, the Earls of Ilchester, it still belongs.

PLATE IV.—Scratched Flints, found on the surface of the soil.

(1) Well-made scraper, with coarse and fine striæ ; Sussex, near Beachy Head.
(2) Worked, with fine striæ ; Portesham, Dorset.
(3) Well-made scraper, with coarse and fine striæ ; Portesham.
(4) Knife or saw, with coarse striæ : near Maiden Castle, Dorset.
(5) Scraper, having on it a portion of the original surface of the nodule. This surface has numerous fine striæ and one long iron-stained mark caused by the plough ; Sussex, near Beachy Head.
(6) An unworked naturally fractured nodule, having on the inner surface many striæ, mostly coarse; Bradford Peverell, near Dorchester.

Dorset during the Glacial Period.

By Hy. Colley March, M.D., F.S.A.

Read before the Geological Section in December, 1909.

In some parts of Europe there are evidences both of *inglaciation* and of *deglaciation*, and in others of deglaciation only. The proofs of inglaciation are concerned with dynamic pressure, pressure with movement on the land surface. Such are the polished and grooved or striated rocks over which the glacier slid, bearing its impacted boulders and rock fragments; and the contour and composition of the moraines which differ distinctly from beds of débris brought down by torrents.

Moraine-stuff, according to Geikie, is angular rubbish which has fallen from cliffs and crags, and is carried along by glaciers.

Boulders are large erratics; any transported mass, as clay and chalk, or large water-worn blocks of stone.—1.

Boulder-clay denotes the stiff unlaminated clays of the "Drift," containing numerous boulders and pebbles. These clays have been produced either by floating ice dragging on a sea-bottom, or by the dynamic pressure of glaciers on land. The clay has the colour of the formation from which it was derived—red, from old red sandstone, dark blue from coal shales, and creamy from oolite and chalk.—2.

Boulder-clay often consists of materials graduating downwards from the smallest stones, through sand-grains of various degrees of fineness, down to rock-meal.—3.

Stones in the boulder-clay are usually oblong, have one or more flat sides or soles, are smoothed or polished, and present rounded edges. When they consist of a fine-grained enduring rock they are generally stricted.—4.

An *ice-sheet* is the deep mantle of snow and ice which covers land. It may remain stationary as sedentary ice, but more often it either descends as a glacier to lower levels where it is melted, or creeps out to sea and becomes an iceberg. An example of sedentary ice can be observed in Alaska. About a mile from the sea the ice forms a ridge two miles wide and 250 feet high, *overlaid with clay and vegetable mould*. The surrounding country has no high land or rock-hills from which a glacier might have been derived. The continuity of the mossy surface shows that the ice must be quite destitute of motion. It takes upon itself the functions of a regular stratified rock.—5.

1—Melland Reade. Q.J.G.S., xxxviii., 220.
2—David Page.—Hand-book.
3—Percy Kendall. Glac. Mag., ii., 145.
4—Geikie.
5—W. H. Dall. Q.J.G.S., xxxviii., 234.

Corrie-glaciers hardly creep beyond the recesses in which they are formed and do not reach even the nearest valley.—6.

After a glacier has passed over soft rocks like chalk, or oolite, the striæ that it caused must rapidly disappear upon the melting of the ice. And, on a steep coast, like that of Dorset or of Hampshire, morainic matter must be pushed into the sea by the glacier itself. Thus all the ordinary evidence of an *inglaciation* may have gone thousands of years ago, and proofs only of the *deglaciation* may remain, such as a few scattered stones rubbed or scratched, and a little unstratified drift that can have been neither marine nor fluviatile; though sometimes there may be found confused heaps of sand and gravel, suggesting perhaps the flood of a veritable Ganges rather than their true cause, the rapid and tumultuous melting of large masses of ice and snow.

Drift presents itself in seven forms, marine action being excluded. (1) alluvium, (2) loam, (3) river-gravel, (4) glacial loam, (5) glacial boulder-clay, (6) glacial-gravel, (7) clay-with-flints.—7.

The *clay-with-flints* is essentially a remanié deposit derived from eocene, *or other strata*, above the chalk. The invariable occurrence in it of considerable quantities of rounded quartz sand shows that it cannot have arisen from solution of the chalk. It usually contains, also, pebbles undoubtedly derived from eocene strata, as well as masses of *Sarsen stone*. Its distribution is singularly partial, and it is confined, though not invariably, to districts where outliers of tertiary strata still occur. Water-sheds and isolated hills of chalk, on the other hand, have a capping of a few feet of *unworn* flints, apparently derived from the chalk by solution. Whenever the conditions permitted running water to obtain any power, at a period when chalk was frozen and impervious to a considerable depth, the loose flints were mostly swept away to form *coombe rock* or valley gravel, which is found largely in Sussex, scantily in Hants, and *not at all in Dorset* (?)—8.

It was formerly believed, and was taught by Prof. Geikie himself that the glacial phenomena of this country, such as the "contorted drift" of Cromer, and the presence of marine shells many hundred feet above the sea, were due to the grounding of icebergs, at a time when the land was submerged. But the present opinion, with which Prof. Geikie now agrees, is that they are the result of the actual passage over those districts of the great Scandinavian glacier.—9.

Even the very shells had been ploughed up from the sea bottom, carried over the ground and deposited on mountain slopes at an altitude of over 500 feet.

The whole of northern Europe was buried under a continuous ice-sheet, 770,000 square miles in extent. Its southern edge lay to the south of Ireland, whence it passed along the line of the Bristol Channel across the south of England, keeping to the north of the valley of the Thames. Its thickness, in the northern part of

6—Geikie.
7—Monckton. Geol. Field, p. 42.
8—Geikie, 1896. Glac. Mag., v., 68.
9—Glac. Mag., v., 49.

Britain, was not less than 5,000 feet. The centre of dispersion was the table-land of Scandinavia. A second centre was the Scottish Highlands, and a third the interior of Ireland.—10.

The peculiar syenite of Laurvig, in the south of Norway, has been found in the boulder-clay of Yorkshire. I have myself found it in Lincolnshire.

When the ice-sheet melted, the escaping water would at first flow with little relation to the present main drainage lines. Streams would be let loose over the plateau and hilly ridges, as well as over the plains. To this kind of action may be attributed the masses of gravel and sand which, over so much of northern Europe, rest on boulder-clay— sheets of plateau gravel, and mounds and ridges of sand.—11.

In this country the terminal moraine of the Norse ice-sheet is the range of gravel hills stretching from Flamboro' Head across Holderness and on into Lincolnshire.—12.

In the Isle of Man, the phenomena show that at one part of the glacial period the Irish Sea-basin was filled with an ice-sheet thick enough to over-ride the highest summits, 2,000 feet, of the Island.—13.

Dr. Hicks has carefully examined the proofs of ice-action in N. W. Pembrokeshire. The presence of erratics from North Wales and from Ireland led him to the conclusion that glaciers from those areas coalesced in St. George's Channel, and that the ice which overspread Pembrokeshire was derived from both those sources, as well, probably, as from a flow extending down the channel from more northern areas.

By N. W. Pembrokeshire he means the whole of that portion west of a line drawn from Fishguard on the north, to Haverfordwest on the south. East of this line the ground rises towards the Preselly range of mountains in N. E. Pembrokeshire, which was outside the district in review, a district which included St. David's Head. Here, the highest peaks attain to an altitude of about 600 feet, and the evidences of glaciation, even at the present time, are quite clear up to 400 feet, though the ice probably covered them all. It crept across the ground from a north-westerly or seaward direction, and bore with it *fragments of flint* and boulders of *granite*.

Across St. David's Head the striæ run from W.N.W. to E.S.E. Ramsey Island carries transported materials on its two main crags, of which the highest is 446 feet. The thickness of the ice-sheet could not have been less than 800 feet to 1,000 feet, *and may have been much more*.—14.

Much more it certainly was. The Preselly Mountains are seven miles long and two broad. Cwm Cerwyn, their highest point, is 1,760 feet above O.D. Gower and even the Devonshire coast can be seen from it, and at that altitude, in 1899, I found these erratics—an igneous rock and a granitoid. The mountain

10—Geikie. Text-book of Geology, 2nd Ed.
11—Geikie.
12—Thos. Sheppard. Glac. Mag., iii., 129.
13—Lamplugh. Glac. Mag., v., 73.
14—Glac. Mag., i., 191.

itself consists of slate. The pieces of flint that I show, some of which are worked, and that I found on lower levels, undoubtedly came from Ireland, and were brought to Wales by glaciers, which necessarily spread over Gower.

The deposits associated with the *raised beach* in Gower are:—(1) beach shingle, with shells of recent species, cemented into a firm mass; (2) on this, a reddish sand, probably blown sand; (3) a rubble of strictly local rock fragments—upon this series rest glacial deposits. In South Pembrokeshire the same order of supposition is found, and probably on Caldey Island, near Tenby. On the shore of this island are large erratics of igneous origin.—15.

In 1890 I asked, "Must we not believe that this ice-sheet [described by Prof. Hicks as at least 1,000 feet thick on St. David's Head, and thick enough to have crossed Preselly mountain, 1,760 feet high], advanced into the Bristol Channel, blocking its waters and covering parts of Somerset with secondary and sedentary ice, and causing subsequent lakes and morasses?"

In 1907, I heard from Mr. F. W. Harmer, F.G.S., that he had received from Mr. Horace Woodward a copy of my paper, and that "he finds the existence of ice blocking the Bristol Channel, and covering the S.W. of England, *necessary* to explain some of the phenomena of that region."

As regards the subject under consideration, few things are more important than a knowledge of the origin and distribution of gravels.

The great expanses of river-gravel in England are generally found in districts where there is much old marine *or glacial gravel* from which it has been largely derived A large portion of the Thames valley gravel is only *derived from* pre-existing *glacial gravels* which are themselves made up in great part of old shingles belonging to the tertiary and triassic periods.—16.

The great bulk of the silicious sand on the floor of the Irish Sea is to be derived from the vast deposit of drift formed during the glacial period.—17.

Samples of the sand have been examined by Mr. Clement Reid who says there is little doubt that the bulk of the material has come from the breaking up of pre-existing glacial deposits.—18.

At one time Mr. Monckton was of the opinion that glacial gravels probably never extended more than a mile or two south of Reading, and that since their deposition that valley has been excavated to a depth of 160 feet.—19.

He has since observed that in the plateau-gravels of several localities south of the Thames erratics of the glacial drift occur, quartzites and sand-stones, black chert pebbles, white quartz and occasional boulders of igneous rock. Such localities are Tilehurst, Reading, Cookham, Wimbledon, etc.—20.

15—1909. A. L. Leach. P.G.A., xxi., 188. Mem. Geol. Survey, "The Country around Swansea."
16—Horace Woodward. Geol. of E. & W., 1st ed., p. 328.
17—Hardman. Glac. Mag., ii., 75.
18—Ibid.
19—Glac. Mag., i., 53.
20—Glac. Mag., ii., 20.

Some deposits of *stratified gravels*, sands and clay, varying in thickness from a few feet to over twenty feet, are spread out over the plateau of Hendon, Finchley, Whetstone, and other parts of Middlesex. *They are frequently covered over by the chalky boulder-clay* containing northern erratics.—21.

Glacial gravels occur at Ealing, in Middlesex, 180 feet to 210 feet above O.D. They contain quartz, quartzite, various greenstones, granite, carboniferous limestone, cherty limestone, red sandstone, upper oolite, forest marble, lower greensand, hard chalk, tabular and nodular flint, *Sarsen stones*, etc.—22.

Mr. Osmond Fisher has observed many such gravels, capping the brick-earth, at Ilford, at Grays Thurrock, &c., which he believed to be the trail of land ice.—23.

At Wokingham, in Berks., are much-contorted clays, with boulders of (frozen) gravel driven into them. Mr. Irving derives the gravel from the older plateau-gravels.

Mr. Monckton said that such contortions are generally accepted as evidences of snow or ice; and Mr. Rupert Jones declared that similar conditions existed at Cuckmere and were the effects of ice-action.—24.

The highest point of the Cotteswold Range, 1,134 feet above O.D., carries northern drift and boulder-clay.—25.

The Mendips are remarkably free from drift, but there are some deposits of loam and clay, and a few boulders of old red sandstone and millstone grit which cannot well be accounted for by the action of rain, river or sea.—26.

On the east side of *Dartmoor* beds of gravel reach 1,200 feet, with clays and transported boulders. On the top of Little Haldon, Devon, 800 feet above O.D., the gravel is ten feet thick, and palæozoic pebbles, and chalk-flints and chert. The Haldons and the Blackdowns of Devon are greensand outliers. The latter are 700 feet above O.D. and are covered with pebbles of chert, quartz, rolled flint, and scantily of quartzite.—27.

On Woodborough Hill, Devon, are extensive deposits of gravel derived from the higher drifts. Further west, evidences of glacial action, more or less reliable, have been cited by various authors, and deposits of gravel have been noticed up to 900 feet above O.D.—28.

The drift beds of Devon and Cornwall have been divided by Mr. Belt into upland and lowland deposits.

I. *The upland deposits*, 300 feet to 1,200 feet above O.D., consist of gravels, clays, and transported boulders left in fragmentary patches, and have evidently had, at one time, a much wider extension.

21—Hicks. Glac. Mag., ii., 14.
22—Allen Brown. P.G.A., viii., 173-5-8.
23—Ibid.
24—Q.J.G.S., xlvi., 561-3.
25—Ibid. p. 8-9.
26—Horace Woodward. Geol., p. 316.
27—Thos. Belt. Q.J.G.S., xxxiii., 82-4.
28—Salter. P.G.A., xv., 283.

II. The lowland deposits consist of gravels, clays, and boulders, and exhibit many signs of sudden and tumultuous formation. Mr. Belt was of opinion that the great glacier from Greenland reached the coast of Europe somewhere near Brest, and caused in the West of England an immense fresh-water lake which reached to a height of at least 1,200 feet above the present sea-level; and that in this lake, the drift was deposited by floating ice.—29.

Perhaps it would be safer to refer these phenomena to the action of land ice, and to the subsequent deglaciation.

Mr. Belt also found his "upland gravels" in Cornwall, on Crousa Downs, near St. Keverne, overspread by blocks of syenite. And he discovered gravels with foreign pebbles on Straightway Hill, Devon, and on the summits of the hills surrounding the Vale of Charmouth in Dorset.

It is now requisite, with what courage one can, to approach the Bagshot gravels.

Mr. Lomas exclaims that he is familiar with the writings of Hull, Wood, Prestwich, Moncton, Shrubsole, Irving, and others, on the subject of these deposits, and finds, that each one has his own theory as to their origin, and his own opinion regarding their age.—30.

Mr. Clement Reid maintains that every kind of rock found in the plateau gravels of Sussex and Hampshire has now been traced to the Bagshot gravels of Dorset, and through them to the districts still further west.

On passing from Hampshire into Dorset it is noticeable that the sands are often coarse and *full of small splinters of flint.* At Morden and East Lulworth lenticular masses of coarse subangular gravel, with green sand chert, can be seen. The Bournemouth cliffs show these coarse sands—black-grit, lydite (=radiolarian chert), some greensand chert, *and splinters of flint.*

Further west, the Bagshot gravels contain, in addition, so much quartz and hard subangular palæzooic rocks as to make the finer screened material look like a Cornish beach; and they contain also *Purbeck marble and other Purbeck rocks.*

The various outliers S. and S.W. of Dorchester, all belong to the Bagshot series and not to the Reading beds as formerly supposed.

Sir Joseph Prestwich thought they belonged to some part of the glacial period.

Mr. Horace Woodward had examined this gravel on Blackdown, Portesham, and having found blocks of *sarsen* in it had taken it for drift.—31.

It has been asserted by Mr. Reid and others that from these gravels Budleigh Salterton triassic pebbles are entirely absent. This would indicate, since they occur in the shingle of the Chesil Bank, that the Bagshot gravels were not deposited during submergence. One such pebble, however, which I show, I found near Hardy's

29—Q.J.G.S., xxxii., 80.
30—Glac. Mag., i., 186,
31—Q.J.G.S., lii., 490-5-6 (1896).

Monument; and the late Mr. Hudleston found one on Creechbarrow, 380 feet above O.D. It may be thought that they were carried there by some children.—32.

Mr. Reid further suggests that the pipe-clays of the Bagshot series were derived from the weathering of the Dartmoor granite.—33.

The latest writer on this subject is Mr. Strahan, in the "Geological Memoir of the Neighbourhood of Weymouth," published in 1898. Speaking of the plateau gravels on Blackdown, by the Hardy Monument, 600-700 feet above O.D., he says they consist chiefly of the remains of the dissolution of flinty chalk, together with an abundance of quartzite, pebbles and *sarsens*, from the neighbouring tertiary beds. The only satisfactory explanation seems to him to be that the transport was effected during the glacial period when the freezing of the soil and *a presumably heavy snowfall* would bring into play forces different from those now in operation. *The movement seems to have been from N.E. to S.W.*—34.

Mr. Reid, in a private letter dated 1900, says that on the whole he agrees with Strahan's view.—35.

In 1883, Mr. Irving read a long and important paper on the Bagshot strata of the London Basin and their associated gravels. Speaking of Bournemouth he said that in the coast section exposed on the west of this town there are gravels resting in the Bournemouth sands which, in their composition agree precisely with the gravels of the Bagshot district, *and upon these* are superimposed gravels apparently of glacial origin. In the Bagshot district the limits of such glacial gravel are from 250 feet to 400 feet above O.D., and as a whole they may be classified thus:—

(1) Gravels of the ancient plateau, *stratified* more or less distinctly.
(2) Terrace gravels, *quite unstratified*, of glacial origin.
(3) Lower alluvial gravels of the present river valley.—36.

In 1894, Mr. Gardner pointed out that at Bournemouth there is a series of beds 300 feet thick, entirely of fresh water origin, partly underlying the marine beds. The whole of the deposits to the west of the pier show an entire absence of the wreck of cretaceous rocks. The Bournemouth area was, in later eocene times, the estuary of a *river as large as the Ganges flowing from the south-west through a country of igneous rocks*.—37.

It is, apparently *upon these sands, brought from the south-west* by a Ganges that had flowed over igneous rocks, that Mr. Irving's *glacial graves rest.*

Near South Moreton, eight miles east of Dorchester, and about 60 feet above the present River Frome, is a patch of sand with gravel seams, differing in many respects from the neighbouring Bagshot strata. *Overlying the sand* is a gravel deposit made up of

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32—Proc. Dorset Field Club, xxiii., 174.
33—Q.J.G.S., lii., 492-4.
34—Op. cit., p. 199.
35—Letter to Mr. Jukes Brown.
36—P.G.A., viii., 164-5.
37—P.G.A., xiii., 274-6.

flint, chiefly subangular, a few tertiary pebbles, small pieces of schorl rock, *Purbeck marble*, and quartz up to two inches.

It appears to be a low lying drift deposit of pleistocene age derived from the Bagshot gravels on Blackdown (Dorset).—38.

The subject of Sarsens must now be considered. Blocks of sandy conglomerate occur in the Reading beds of Hertfordshire. The silica cementing these re-arranged materials was derived from decomposition of the soluble silicates of the *felspathic constituents of the glacial drift.* This conglomerate, which is 2½ feet to 3 feet thick, is interesting as continuous with and merging into loose pebbles and sand.—39.

The varying amount of silicious cement in Sarsens is thus accounted for, since it must depend upon the quantity, more or less, or none at all, of any felspathic material brought by glacial agency; and, if true, it would follow that *the silicification of Sarsens is itself a proof that they were covered by glacial drift.*

In a similar bed, at Rickmansworth, in Hertfordshire was found, in 1906, *a Sarsen* about five feet long and two feet six inches wide. It is evidently water-worn.—40.

In the same sandy beds which are 30-40 feet above the level of the present River Gade, were found palæolithic implements, and the molar of an elephant (E. antiquus).

In 1862, near Winchester, in digging foundations for a house, Mr. DuBoulay found, 12 feet below the surface, buried in a mixture of stones and chalky loam, the boulder of which I show a photograph. It was pronounced to be sand-agate, and therefore is either a quartzite or a compact Sarsen. From its lower surface, which is somewhat flat, it rises to a height of 4 feet. A few inches above its base is a well-defined line, above which the whole of the stone is water-worn and perfectly smooth, presenting a mammillated appearance. There are, as well as the bed in which the boulder was found, neighbouring beds of gravel and clay.—41.

The Branksome stone we have all seen. Besides its water-worn surface, some groovings were noticeable along its edge, apparently caused by dynamic pressure. It was buried in a fine sand, and weighed about 10 cwt. I believe it to be a Sarsen.

Valuable help in the question of a glacial distribution of Sarsens was afforded by Prof. Judd in 1901. His article appeared in "Archæologia," vol. lviii., and was a study of the constituents of Stonehenge. He shows that the megaliths of this monument were shaped on the spot, and he has examined microscopically the chips of stone that lay in the soil.

He gives them under nine headings, which may be briefly summarised—

38—Salter. P.G.A., xv., 279.
39—1909. Upfield Jones. Geol. Field, p. 18-19.
40—Represented on p. 46 of the Geol. Field.
41—Letter to myself.

I.—Sarsens. They are concreted portions of a tertiary sandstone, either of the Woolwich and Reading beds, *Prestwich*, or of the Bagshot beds. Micro-sections show that in some cases they are coarse grained, in others very fine grained; the sand grains of which they are composed are sometimes well rounded and at other times angular. Other minerals are sometimes present—felspars, mica, glauconite and *chips of flint*. The grains sometimes show only a small quantity of cement between them—at other times this silicious cement is in large quantity, and the outlines of the original grains can be traced only with difficulty, the rock being almost undistinguishable from a quartzite.

II.—Diabase (greenstones of hornblende and felspar). Some are coarse grained and porphyritic, others are fine grained and almost compact.

III.—Highly altered basic tuffs and agglomerates, generally of a fissile character. They have been called "calcareous chloritic schists," and are evidently of volcanic origin. Fragments of such rocks are so numerous that probably many stones of this kind were used in building Stonehenge. But owing to their fissile character and the ease with which they succumb to weathering all seem to have disappeared except a stump which was discovered by H. Cunnington in 1881.

IV.—Altered rhyolites and dacites, often called hornstones. It is probable that a stone consisting of this material once stood at Stonehenge, but has now disappeared. They show fluxion structure, and represent old lavas.

V.—Sandstones, grits and quartzites. The rock of the "altar stone" is a micaceous sandstone. A similar rock is found outcropping at Frome, in Somerset. The quartzites do not appear to be indurated Sarsens, but may belong, like the Stiper-stones, to true quartzites. (42). All these rocks are possibly representatives of pre-Cambrian and palæozoic sandstones.

VI.—Greywackes—which consist mainly of grains of quartz, much altered felspar, and argillaceous matter. Such stones exist in Wales, Devon and Cornwall. Their absence from the existing circles at Stonehenge is doubtless due to their fissility and ease of decomposition.

VII.—Argillaceous flagstones and slates. These would be especially liable to break up by frost, &c.

VIII.—Glauconitic sandstone.

IX.—Flints. These are probably fragments struck off in renewing the points of tools (and perhaps in working other stones).

Most of the rock fragments are perfectly angular.

42—The Stiper-stones, it may be said, are silicious sandstones which occasionally pass into crystalline quartz-rock.—*Horace Woodward.*

The mauls used by the builders are masses of Sarsen, of exceptional hardness and induration, approaching quartzite in texture.—43.

It is probable that when the erection of Stonehenge was begun Salisbury Plain was sprinkled over thickly with great Sarsens, and more sparingly with darker coloured boulders, the last relics of the glacial drift which had been nearly denuded away.

It is well known that scattered glacial boulders occur far south of Wiltshire. One of a slaty rock, comparable in size of the largest of these "blue stones," can be seen *on the hills to the south of London.*

There is no one place from which all the foreign stones, well recognised, could have been brought by the builders, and in no case would they have deferred their chipping and shaping till after a long and toilsome journey—a chipping and shaping which, in some instances have reduced these "blue stones" to half their original dimensions.

Perhaps one ought to mention a few competitive theories of Stonehenge. Giraldus Cambrensis, in 1187, thought the megaliths had been brought from the farthest parts of Africa by giants and set up in Ireland, and afterwards transported to Britain and erected as a memorial to those Celts who were slain at Ambresbury by the concealed knives of Saxons. A fuller account had been given previously, in 1147, by Geoffrey of Monmouth. He describes how a fleet was got ready in the year of our Lord 490, with 1500 men, who made war upon the Irish and defeated them, and carried off their great megalithic circle, their Giants' Dance, every stone of which was known to possess some healing virtue.

James Fergusson, who wrote in 1872, says in his "Rude Stone Monuments," that the blue stones of Stonehenge probably came from Ireland.

Prof. Boyd Dawkins remarks in his "Early Man in Britain," published 1880, that the foreign stones may have come from Wales, Cornwall or from the Channel Islands; and adds that the men who carried them off must have been influenced by strong religious feeling. The more so, perhaps, since Prof. Judd declares that there is no one place where all the stones could have been found.

Mr. Monckton thinks they were brought from "some distant place" by an early race of men, and chipped at a later time by a different people; thus reverting to the views of Giraldus Cambrensis.

And Mr. Clement Reid believes that they were brought up the Avon on rafts from an erratic-strewn plain now sunk beneath the sea.

Leaving Stonehenge, it is necessary to glance at certain difficulties presented by the chalk. Mr. R. M. Deeley has observed

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43—Details of eight micro-sections, p. 114.

that in all glacial districts, *porous rocks beneath boulder clay or over which ice has passed* are contorted, torn and trailed, and but seldom striated or polished.—44.

Striæ can be seen on chalk pebbles in Lincolnshire, partly because the chalk there is very hard, and chiefly because they have been preserved in boulder clay. A good specimen from a brickfield near Kingthorpe is shown.

Mr. Jerome Harrison considers that the Yorkshire chalk wolds were devoid of native glaciers, because the hill tops are covered with loose weather-worn blocks which are neither smoothed nor striated; and he attributes the absence of glaciers to a deficiency in the snowfall.—45.

This appears to be a circular argument. There were no glaciers because there was no snowfall; there was no snowfall because there were no glaciers.

Moreover, it has been observed by Mr. Wright that in Southern Greenland and in Labrador, the amount of glacial drift still remaining on land now free from ice *is remarkably small*. There is scarcely any "till" in either region. The explanation doubtless is, he thinks, that the loose material was nearly all removed and deposited in the sea.—46.

And Mr. Mortimer has recently pointed out that though the un-water-worn chalk gravel on the Yorkshire chalk hills was formerly considered to be only rain-wash or rubbish disengaged by frost and by ordinary atmospheric action, yet this gravel is not accumulated at the base of slopes; it is collected at elevated points and often marks the scarps of eminences. It is the result of glacial agency.—47.

Coombes are not forming now. In fact many of them are filling up. On this subject Mr. Clement Reid observes that at Fisherton, near Salisbury, in beds which correspond with the coombe rock, the remains of many species of high-northern mammals are found; and at Bovey Tracey, Devon (about 15 miles from the sea) in similar beds, occur the Arctic birch, bearberry and Northern willow. This, he adds, would indicate a mean temperature in the South of England very considerably below the freezing point, so that all rocks not protected by snow would be permanently frozen to *a depth of several hundred feet*. He concludes that there was probably little snow in the winter, and that there fell in summer torrential rains which formed the coombes as the water ran off, unable to penetrate the surface.—48.

On the other hand, Canon Gover, who had long studied this question in the field, thought that the coombes had been excavated by glacial ice.—49.

44—Glac. Mag., v., 137.
45—Glac. Mag., iii., 74-5.
46—Glac. Mag., ii., 142.
47—P.G.A., viii., 287.
48—Q.J.G.S., xliii., 369, 370-1.
49—Ibid.

It seems more natural to suppose that the precipitation would have been much greater then than it is at present, and would have been far more abundant in winter than in summer, and that even in summer it would have taken the form of snow rather than of torrential rains, which must have frozen on the ground. And if glaciers covered the downs it would have been the sub-glacial streams of August that hollowed out the coombes.

Mr. Lamplugh thinks that the growth of ice-sheets has depended far more on the amount of snowfall than on the severity of the cold, and he adds the following valuable remarks.

Taking it as granted that an unbroken ice-sheet extended from Scandinavia S.W. over the greater portion of the British Isles and that its surface, in the northern parts of the North Sea and Irish Sea reached an elevation of at least 1,000 feet, and probably *very much more*, above present sea level, this must have had a considerable effect upon the snowfall of the region. The evaporating water-surfaces of the Baltic, North and Irish seas would have been obliterated, but there would have been provided a *high-level condensation area* for the moisture-laden *currents from the North Atlantic.*

These would infringe upon a plateau higher than the present land, and with a surface temperature never above 32° Fht. Hence a large proportion of the total precipitation would fall within a limited distance of the ice border. We should then have a very considerable addition to the mass of the ice-sheet towards its border, independently of any flow from the north.

This tendency towards marginal accumulation would be counteracted by the greater freedom of movement on *free ice-borders fronting the sea.*—50.

Thus, it would appear that, apart from the continuance of any glacial flow from the north, this marginal accumulation of ice on frozen land would steadily advance towards the south, fed by moisture-laden currents, until it broke off, and floated away in the sea.

In 1888 I visited the Scilly Isles, and found and now show some scattered pieces of flint and even a few that are worked, and I concluded that they had been brought by ice from *Ireand.* In a Geological Memoir, by George Barrow, of the Isle of Scilly, published in 1906 are the following statements:—

"Rocks of a distant origin and chalk flints were found on St. Martin's, 160 feet above O.D. After flint the most common pebbles are a reddish brown sandstone, *often striated*" (? Sarsen).—51.

"There are also *greensand chert,* granite derivatives from the S.W. of England, fragments of kellas, and igneous materials. The flint and chert resemble those in the subangular gravels of Haldon in Devon, and their occurence suggests *an easterly origin.*

"That these stones (on Tresco found at the height of 105 feet) were brought by glacial agency admits of little doubt. It is proved by their distribution and their striæ. They were carried by floe-ice."

50—Glac. Mag., i., 231.
51—pp. 21, 22, 23.

Some of these icebergs, reaching the Scilly Isles from the east, and bearing flint and greensand chert, and perhaps Sarsens, may well have broken away from Dorset.

It is known that river courses were greatly disturbed by glaciation. Mr. Salter shows that drift gravels occur on the hills above Portesham, near the Hellstone, about 600 feet above O.D.—(it was here I found my Budleigh Salterton pebble)—and at lower levels near Weymouth, pointing to another valley system now almost entirely swept away.

On the east side of Southampton Water, by Netley, and at Lee-on-the-Solent, are thick beds of gravel containing *implements* and *frequent Sarsens.* It signifies that the Frome at that time continued to flow beyond the Solent towards what is now Selsea Bill.—52.

Mr. Harmer calls "the case of *Goring Gap*" unique. He says that at no other point south of the Little Ouse-Waveney depression does water flow *through the chalk range* from one side to the other. West of the Goring Gap the country (of the Thames) shows a lake-like area of depression drained by a gorge of modern aspect excavated transversely *across* the adjacent range of hills, and cut down to a level of the plains on either side. The Thames originally flowed north to the Wash, but this course must have been checked by ice, and the river was compelled to cut through the chalk ridge.—53.

Perhaps, when Mr. Harmer used the word unique, he had not considered the case of the river Corfe, in Dorset.

The Corfe river, which flows north into the Frome, is formed by the union of the Steeple (or Wicken) Brook and the Byle Brook after they have independently cut their way through the chalk ridge, one on either side of Corfe Castle. Mr. Strahan considers this double breach to have been initiated by a pair of streams engendered on the northern slope of the Purbeck anticline, at a time when the arch of the fold was unbroken and its drainage still of the normal order, passing transversely *over* the chalk ridge.

Mr. Osborne White thinks the two streams cannot boast such an antiquity.

Mr. Hudleston considered—(54)—that the eastern and western affluents of the Corfe formerly *united on the south* of the chalk outcrop and traversed it by a single channel, and that when this channel had been cut down to about the level of the summit of Castle Hill, or about 170 feet below the ridge on either side, the two streams became separated, and commenced to carve out independent gorges. But he offered no suggestion of the *cause* of this sudden separation.

Mr. O. White thinks the cause may have been a displacement of their northerly ancient junction, under flood-plain conditions, during a temporary cessation of the cutting down process. There

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52—P.G.A., xv., 279.
53—Q.J.G.S., lxiii., 470.
54—Guide to Wareham—Bright's, Ltd., Bournemouth.

are indications that the Byle Brook, though now the smaller, played the part of main stream, or divertor, in this change.—55.

If it is granted that the union of these two streams took place, originally, south of the chalk ridge, over which the joint river flowed by a single gap, it is easy to follow the Goring case and to suppose that the course of the joint river was for a time blocked by sedentary ice, which piled itself up in the only gorge, and compelled any running water to cut a new channel.

Are there any moraines in Dorset? Personally, I think there are, but mostly of the deglaciation or remanié type. Though, indeed, according to the view suggested, most of the morainic stuff would not have been left on the land, but must have been pushed into the sea.

Mr. Osmond Fisher firmly believes, and in my opinion he is right, that a moraine exists at Chesilton on Portland. I have had, in the past, much correspondence with him on the subject, and have often visited the spot, and now show some of the material. In a letter I received from him last week he permits me to say that he thinks the deposit is a lateral moraine from a glacier descending the valley. The Kimeridge clay, near the governor's house, was squeezed up beneath it by pressure. (See geol. map).

The accumulation consists of angular rubble in clay, with large subangular blocks of Portland stone and some erratics, among which is a large piece of Hastings-sand rock.

The clay of this moraine, of which a section appears in the cliff at Chesilton, is quite different from the Kimeridge clay which comes to the surface near the governor's house. Both are shown.

In this connection it should be noted that, according to Mr. Belt, gravel deposits overlie in Portland remains of Elephas antiquus.—56.

The origin of the Chesil Bank is a standing puzzle. It is certain that the pebbles travel from west to east, and the reason why the larger ones travel faster and go farther than the small ones is understood. But how came the bank there at all, and why was not the shingle cast up on the shore? During heavy gales these pebbles are sometimes greatly displaced, and it can then be seen that they rest upon a bed of clay. That this is Kimeridge clay rather than Oxford clay is probable from the fact of its occurrence at Portland, where Mr. Fisher thinks it was squeezed up by a glacier.

In Novaya Zemlya, according to Mr. H. W. Fielden, ridges of *gravel and mud* are pushed up, by glacial action, from the sea bottom so as to form long causeways connecting islands to each other or to the mainland.—57.

It has been thought that the bed of the Fleet, of the water between the Chesil Bank and the mainland, was hollowed out by a stream, but the water-shed is too small and the current is too feeble to have produced any scouring effect whatever.

55—H. J. Osborne White—P.G.A., xvii., 400-412.
56—Q.J.G.S., xxxii., 82, 1876.
57—Glac. Mag., v., 95.

There is a gravel deposit on the landward margin of the Fleet, near Chickerel, and some of it is striated, and specimens are now shown.

Can the puzzle be solved by a theory of glaciation? Did the glacier that scratched the Chickerel gravel push up the clay of the Chesil Bank.

Of other matters of associated interest time does not permit me to speak; though passing reference must be made to the striation of Mr. Ben. Harrison's eoliths of the plateau gravels of Sussex, and of palæolithic implements, some of which are on the table.

In fine, the stones that I now show. grooved, rubbed, striated are only a small part, whether in number or in size, of those I have collected.

Two years ago Mr. Horace Woodward came and inspected my collection, and subsequently, in December 1907, wrote to me as follows: "The facts you have gathered with regard to the drift phenomena in South Dorset are most interesting, and I am quite convinced that you have good evidence of the action of local snow and ice and the slipping and melting of masses of snow and ice and incorporated material. The local detritus on the slopes of the Cotteswold Hills and on the South coast the Coombe rock of Sussex, the Selsea erratics and the glacial phenomena of Scilly all come to support your views."

Let us, in conclusion, declare our allegiance to Sir William Hamilton's "Law of Parcimony." Formulated in 1852, it was shown by John Stuart Mill to be a principle identical with the famous maxim, "Entia non sunt multiplicanda præter necessitatem," meaning that substances, powers, and causes are not to be needlessly multiplied. The law is thus expressed, "Neither more (numerous) nor more onerous causes are to be assumed than are necessary to account for the phenomena." And as an example he says that a special hypothesis which serves to explain only one phenomenon is more onerous than a general hypothesis which will explain many phenomena.

If this law be obeyed, the hypothesis that there was a glaciation of Dorset will ultimately prevail.

Hy. Colley March.

2nd December, 1909.

Note.—In the Taunton Castle Museum is a specimen of glacial striation from a mass of Old Red Sandstone about 200 yards along the lower road in the grounds at Ashley Lodge, near Porlock Weir. It was found by Mr. G Lucy, of Gloucester, Feb, 1874.

H. C. M.

What Evidence have we of Ice-Action in Dorset?

By Dr. William T. Ord, F.G.S.

Read before the Geological Section, January, 1910.

In considering a subject of such difficulty and importance as the Glacial Period and its effects as found in any given district, it is necessary to use exactness of speech and in so doing to carefully distinguish between fact and theory. This is the only scientific method. To state that a certain deposit of such and such a nature occurs at a certain spot is a matter of fact, to state that it has been caused by an ice sheet 5,000ft. thick proceeding from Scandinavia is theory. This may be true or it may not be true, but it cannot justly be stated in the same terms as can a fact of observation. Whilst the facts referred to in Dr. Colley March's paper are beyond dispute, the theories advanced to account for them are matters of opinion, which, although we should treat them with respect owing to the high authorities adduced in their support, are nevertheless open for our discussion this afternoon.

Our consideration of the paper before us will naturally divide itself into two sections,—Firstly the account of the glaciation of England as briefly summed up on pp. 72 and 73, with various examples on pp. 74 and 75; and secondly the account of supposed remains and effects of ice action in Dorset and elsewhere as detailed in the latter half of Dr. Colley March's paper. On pages 71 and 72 we are given an admirable summary of the principal deposits usually attributed to ice-action, with which we must all be fully familiar.

As we all know the *Glacial Period* is a term used to describe the last geological age immediately preceding that in which we live, and which was characterised by an intense degree of cold, and the formation of the superficial deposits I have just referred to. Now whilst all geologists agree that at this time glaciation was proceeding in the mountains of Scotland, the Lake district, North and South Wales, and to a much greater extent than now in Northern Europe generally, many take exception to the advanced views of those who believe in a supposed vast glacier proceeding from Scandinavia, filling up the North Sea and the Baltic, covering the whole of Northern Europe, sweeping over Scotland and Ireland and whose southern edge lay to the south of Ireland, and in England extended to the valley of the Thames. And not content with this, in the paper before us Dr. Colley March proposes to drag this terrific ice sheet across the Bristol Channel, over the Mendips, and finally to smother the county of Dorset beneath its icy mantle. Such is the theory now presented to us for consideration.

But on the other hand there are distinguished geologists who dissent from this extreme view, some even who can hardly be said

to believe in a glacial period at all, such as Sir Henry Howorth, who has argued with great force and precision that a great part of the supposed evidences of the glacial period can best be explained by the violent action of flowing water and torrents such as he believes were produced by the rapid submergence and emergence of land at the close of the palæolithic age. This is an example of an extreme view, held nevertheless by a man of considerable eminence as a geologist, and whose opinions cannot lightly be disregarded. It becomes, I think, those who are not experts to favour moderate views and leave the specialists to fight out the extreme views between themselves. Whilst referring no more to Sir Henry Howorth, I will proceed briefly to show why in the opinionsof many geologists it is impossible to credit the theory of this vast Scandinavian ice cap extending over Great Britain, and further to show that even if such had been the case it could not have produced the phenomena which its existence has been invoked to account for.

As an example of the conditions which are supposed to have prevailed over the whole of Northern Europe during the glacial period, we are directed by writers on the subject, from the day of Lyell onwards, to the present condition of Greenland, with its huge covering of ice, possibly 6,000 or more feet in thickness. It is largely by a study of the conditions there prevailing to-day that an understanding of ice action as it was during the glacial period can be obtained. On looking at a map of the Arctic regions we find that this enormous ice-covering is largely a local condition, obtaining chiefly in Greenland and in certain parts of Alaska, whilst there are vast tracts of land, especially in northern Siberia, but also in North America, as well as many islands, which, although the temperature is as low or lower than in Greenland, have no such ice-covering at all. In these parts there may be merely local glaciers, and in some only winter ice and snow prevail. Professor Bonney in his book on "Ice Work," says,* "A study of the Arctic regions quickly impresses one fact upon our minds, viz., the markedly unequal distribution of the larger masses of land ice. This completely covers a very large part of Greenland, while there are few glaciers of importance in Grinnell Land on the opposite side of Smith Sound. The other islands north of the American continent, though some are of fair size and rise to a considerable elevation, nowhere exhibit an accumulation of ice in any way comparable with that of Greenland. The same is true of the northern part of Siberia; the cold there is no less intense than in the north of the other continent; a very large slice of Siberia is included within the annual isotherm of 32° F., no inconsiderable piece within that of 5°, while the January temperature in Yatatsk in latitude 62° north is as low as —40° F., and the soil is permanently frozen to a depth of about 700ft. Yet in all this region, notwithstanding the intense cold, glaciers are unknown. . . . . So far as temperature goes, a Glacial Epoch rules in Siberia, but no marks of ice-action will be left behind in the event of its departure." It is evident therefore that the mere lowness of temperature which formerly prevailed will not justify the assumption

* p. 39. *Ed.* 1896.

that the British Isles were covered once with ice as is Greenland now, much less that such a sheet of ice could have been continuous across the North Sea, Baltic, and Irish Channel, unless the conditions which now occur in Greenland prevailed here also. What then are these conditions that determine the formation of such an ice-sheet? The most important of these is stated to be a large land area. It is true that "A mantle of perpetual snow swathes the islands of the Arctic Ocean—not only those of smaller size on the Greenland coast, but also those, both small and large to the north of the American continent; yet in none is an ice-sheet found; this seems to require a land mass of almost continental dimensions." * This fact is equally apparent in the Antarctic continent where we have the largest example of a huge ice-cap in the world. There is no such continental area to form such an ice-cap in Great Britain or Ireland, nor could there have been in the North Sea or Irish Channel, even had their beds been raised above the present sea level during the glacial period. Even if the area of Scandinavia were sufficient to provide an ice-cap of the dimensions required, and were the conditions such as now obtain in Greenland, it can be shown that this huge glacier could not have extended far beyond its own coast-line, much less have swept across the North Sea. It is remarkable that in Greenland the ice does not extend as a rule even so far as its own coast line, except where it works down the valleys and fiords as glaciers. These latter provide huge icebergs, which float down into the North Atlantic, but the lower ground near the coast seems to be free from permanent snow and ice.† This is well seen in a series of beautiful photographs in Messrs. Chamberlin and Salisbury's "Geological Processes and their Results,"‡ in which the terminal edges of the ice-cap, and the protruding glaciers are admirably shown. Now the west coast of Scandinavia resembles that of Greenland, in its fiords and islands, with the high plateau inland, and were it possible for an ice-cap to proceed seawards and traverse the German Ocean to invade these shores, some signs of such action would surely be seen in Greenland which is now enjoying its glacial period. On the contrary we are told that, "Almost everywhere the lower ground near the coast seems free from permanent snow." The great ice sheet being confined to the high table-land and showing no tendency to invade the sea shore, much less the sea itself. If it be contended that the bed of the North Sea was raised into dry land at the time, the position is not improved for the glacialists. For judging from the condition of Greenland, its shores and adjacent islands, the ice would have broken off around what is now the coast line and piled up there in masses at the base of the precipitous cliffs of the present Norwegian shores. The lower grounds near the coast would there, as now in Greenland, tend to remain clear of permanent snow.

There is another condition essential for the formation of a permanent ice-sheet, and that is the snowfall, which depends for its

* Bonney's Ice-Work, p. 40.
† *Ibid.*, p 49.
‡ pp. 250-300, where a full account is given of ice-action in Greenland.

amount on the humidity of the atmosphere. This would be heaviest in the high plateau, and were other conditions favourable the low lying land of what is now the North Sea could hardly have a snow-fall sufficient to form ice-sheets thousands of feet thick, whatever might be the condition of the adjacent Norwegian ice-sheet. Indeed from Lieutenant Ryder's East Greenland Expedition we learn that the plateau of Greenland often exhibits bare ground during the summer, whilst this is the rule near the coasts, and that herbage sufficient to support numbers of reindeer, musk-oxen, hares, lemmings and other animals grows in these districts."* From this I think we must infer that even during the glacial period there could have been no continuity of an ice-sheet extending from Scandinavia to England.

Supposing, however, that this were possible, and that such an ice-sheet enveloped the coast lines, by what power is it to traverse the sea-bottom (even if elevated) and to ascend up to our east coast and there deposit its debris high up on the clifts of Cromer and elsewhere over England? Now the area of Scandinavia is only an eighth part of that of Greenland; if therefore the present Greenland ice-sheet is unable to cover its own shores, much less to cross over Davis Strait—which is about 100 miles wide—how much less could an ice-sheet from Scandinavia cross the 300 miles of the North Sea and sweep over the British Isles? Evidently it is no use appealing to the existing order of affairs in Greenland to support this theory. We will turn now to Scandinavia and see if there is evidence to be found of the existence of such an ice-sheet in glacial times—for were this true we may expect to find that it has left abundant traces of its action.

From the well-known power of glaciers in polishing, grinding down and scoring with striæ the hardest rocks over which they pass, we should expect to find that all the rocks and small islands over which this vast ice-sheet, 5,000ft. thick, spread in leaving the shores of Norway for our own, had been planed down, smoothed and striated, and all sharp edges removed. Now off the coast of Norway are the well-known Lofoden islands, which lie within the Arctic circle and must have been enveloped in the great ice-sheet. Of these, Mr. Williams, writing in the Quarterly Journal of Science says,† "Northwards these rocks gradually progress in magnitude, until they become mountains of 3,000 to 4,000ft. in height . . . . the remarkably angular and jagged character of these rocks . . . renders it very easy to trace the limits of glaciation on viewing them from a distance. The outermost and smallest rocks show from a distance no signs of glaciation." How, we may ask, if the Scandinavian ice-sheet was big enough to cross the ocean was it possible for these jagged rocks to escape being cut down, worn and denuded by ice-action?

Another observer, Karl Petersen, writing in *Nature*,‡ gives evidence that the ice in glacial times, which gathered on the

* Geographical Journal, 1893, Vol. 1, p. 43.
†Vol. vii, 232-233.
‡ Vol. xxxii, p. 202.

northern highlands of Norway, did not even reach the small islands off the shore, much less could it have proceeded across the North Sea. He examined an extensive district of the coast line and many fiords and sounds, one 120 kilometres in length, and a coast line 90 kilometres long, and in none of these could any signs be found that inland ice had traversed them on its way to the coast. Not only were the ro ks unworn by ice action, but there were no moraine drift deposits or travelled blocks or boulders, except in places where they are evidently due to shore-ice or small local glaciers. Of Bals fiord, a large and important inlet which could not possibly have escaped, Mr. Petersen says, "I have therefore come to the conclusion that the continuous ice-stream of the glacial period cannot have reached beyond the basin of the fiord. From the premises thus set forth," he concludes, "we may draw the deduction that the inland ice in North Norway, during the glacial age, did not move forward through the sounds to the ocean." Turning now to South Norway, the evidence there also seems to point to the action of shore-ice and small local glaciers as affecting the rocks and depositing erratics at the coast, but such evidence is wanting above a height of 120ft.* Another authority, Mr. M. F. Stanley, F.G.S., in a paper read before the Geological Society in 1887, said of Norway, "The aspect of the coast for hundreds of miles consecutively has a uniform character of jagged and pointed rocks nearly to the sea-level. At the mouths of the fiords the rocks are more rounded, particularly at heights less than 100 feet." Again he expressed the opinion that "ice had never prevailed along the entire west coast of Norway, neither had inland ice of any considerable thickness flowed over this coast in sufficient volume to wear off the points of the sharply fractured granite. Even the rocks below 100 feet are not more worn than is sometimes the case in tropical climates. The 'shark's teeth' of the Lofodens have not been planed down, nor is there any vestige of the great ice-sheet of our text books within the Arctic circle upon the coast of Norway." Petersen, after his thorough exploration of the Norwegian coast, arrived at a similar conclusion, and says, "My deduction, therefore, is that the theory of the ice streams from the Scandinavian peninsula having advanced and covered the North Sea, the Baltic, and reached the central European plain, England, the Orkneys and the Shetlands, cannot, with the facts at our disposal, be accepted as a scientific doctrine."† These apparently insuperable difficulties to the great ice-sheet theory are also described by Professor Bonney in his "Ice Work, past and present." ‡ The same authority also lays stress upon another difficulty, that of imagining by what forces the Scandinavian land-ice can possibly have extended to our east coast, pointing out that even were the *vis a tergo* sufficient to propel it so far, in following the line of least resistance it would rather have gone southwards towards the English Channel than over the British Isles. The two hypotheses invented to escape this difficulty—one that the valley of the North Sea was raised up to a flat surface during the glacial period, and the other

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* *Nature*, vol. xxx, pp. 202-205.
† *Nature*, in loco cit. ‡ page 77, et seq.

that the channel of the German Ocean had not then been excavated, only introduce greater difficulties to their advocates.

Turning now from Scandinavia we will briefly consider a few points in the glaciation of our own country bearing upon this subject. And it has been chiefly to explain the relics of ice-work in the British Isles that the idea of this vast ice-sheet has originated, it having been supposed, and being still maintained by advanced glacialists, that no other hypothesis can account for the effects of glaciation here met with. Time will only permit me to touch upon the main features of the argument. Now according to the late Mr. Croll, whose ingenious theory as to the eccentricity of the earth's orbit (which, however, has now been generally relinquished) advanced him to the position of a high priest of the extreme glacial cult, the ice-sheet extended as far westwards as the Faroe Islands. This statement, however, was subsequently contradicted by Mr. James Geikie, who says in his *Prehistoric Europe*,* "these islands supported a local and independent ice-sheet of their own, which flowed outwards in all directions into the surrounding ocean." Next in the case of the Shetland Islands, which all advocates of the great ice-sheet admit must have been enveloped by it, Mr. Milne Horne questions this view in the *Q. J. G. Soc.*,† pointing out that the striations of the rocks disprove this supposition, there being no uniformity in their direction, except near the south end of the group, where instead of being from the north-east the glacial markings are from the north-west. He believes that they cannot have been caused by ice-sheets from Norway, but must have originated in local glaciers. Messrs. Peach‡ and Horne both make the striations on the Orkneys come from the south-east, but how can, we may ask, these have been caused by ice proceeding from the north-east? Passing to the North of Scotland, where, if anywhere, striæ on the rocks from north or north-east must have been caused if the Scandinavian ice-theory be true, various observers seem to agree in the general divergence of ice-striæ, and none seem able to determine a definite direction for these.§ They appear to radiate from the higher mountains in the directions which we would expect if caused by local glaciers.

Two other significant relics of ice-action which are freely distributed over our country, and evidence of the existence of which south of the Thames valley is claimed by Dr. Colley March, are (1) the presence of foreign erratic blocks, and (2) the frequent beds of glacial boulder clay and gravels. None of these, however, demand the theory of a huge ice-sheet for their explanation. It has been shown by many writers and is still believed by distinguished geologists that these can amply be accounted for by the transport of materials by floating ice and ice-bergs, whether from Norway or elsewhere consequent upon the submergences to which England was subject in many parts during and after the glacial period, and also

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* pp. 205-206.
† November, 1879.
‡ British Association Reports, 1864.
§ Glacial Nightmare and the Flood. Vol. ii, pp. 712-713.

to the passage of local glaciers from the chief centres of dispersion in the Highlands of Scotland, North Wales, the Lake district and other mountainous centres. For the reasons given I must therefore disagree with the supposition of the great Scandinavian ice-sheet, in accordance with the views of all the older geologists, who followed the teaching of Sir Charles Lyell and his compeers. Although for a time many have been diverted to the more extreme views of Prof. Geikie and his followers, we have others who are still content to postulate a local glaciation for England, amongst whom were Sir William Dawson and the late Duke of Argyle, whilst still living and working are Professor Bonney, Sir Henry Howorth and Prof. Hughes of Cambridge, with many of lesser distinction.* Well-known to us locally is Mr. Spicer, science lecturer to the Oxford University Extension, and a geologist of more than local repute. He is of opinion that the main sheet glaciation died out near Buckingham, whilst in the Chilterns and in the Thames Valley and along the Berkshire downs there is no evidence of strong glaciation at all, but rather of sea-borne ice and local ice-patches on the re-emergence of these valleys. Previous to subsidence there was very serious glaciation of the ridges right down to Devon. He allows that there was sheet-ice along the Pennines, but as the ice did not fill up all the valleys in Yorkshire, the thickness was not very great. At the Ouse the ice broke into bergs and floated south, and on re-emergence of the land the climate was getting warmer. Mr. Spicer concludes: "The mistake usually made is in supposing the land was stationary during the glacial period." This opinion, expressed in a private letter to me, I think gives us the moderate view of a thoroughly up-to-date geologist, who has investigated these questions on the spot, and carefully formed his opinions. One of the most eminent of German geologists, Professor Kayser, although he adopts an advanced attitude for his own country, modifies it in our case. He writes†: "Although England was completely covered by ice in the Ice Age, yet, with the exception of the south-east part, which was covered with Scandinavian ice, it was covered by its own glaciers radiating from the centre of the country. The ice scratches are everywhere directed from the centre of the island to the coasts, and allow of no doubt on this point."

If this be the true view, we cannot agree with Dr. Colley March in his positive statements on this subject on page 72. Similarly on page 74, the idea of the Bristol Channel being blocked by ice cannot be accepted, neither can there be any reason for dragging a Scandinavian ice-sheet further south to the shores of Dorset. This portion of my task then is ended. I have endeavoured to show the facts so far do not support this theory, and that our county of Dorset may be admitted to have escaped the indignity of having ever been smothered by a mighty covering of ice "made in Norway."

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*See also Mr. David's paper on ice-action in parts of Wales in J. G. Soc., xxxix, p. 39.

† Text Book of Comparative Geology, p. 385.

This brings me to the pleasanter task of examining the evidences of ice-action which Dr. Colley March has so ably set before us as affecting the Southern Counties, and which disagreement with the great ice-sheet theory need in no way prejudice us from favourably considering.

The sheets of plateau gravel, mounds and ridges of sand, often resting on boulder clay, on the exclusion of the ice-sheet theory, would find their more natural explanation in the violent current action of the receding waters as the land emerged from the sea at the close of the glacial period, the boulder clay and till having been laid down by melting icebergs and ice-flows during partial submergences. Boulder-clay is now, according to the Challenger expedition, being laid down under the sea within the Arctic circle, one hundred miles from land, by the melting floe ice, in Baffin's Bay and the Labrador coast*. With regard to the Isle of Man, instead of ice having reached to the height of 2,000 feet, as stated on page 73, a writer in the *Geological Magazine*† produces evidence of the island having been submerged to a depth of 2,000 feet, during the progress of which I would suggest that the phenomena referred to by Dr. Colley March were produced. Similarly the facts of glaciation in North-west Pembrokeshire may be explained by substituting the word "submergence" for "altitude," and the depth of submergence, rather than the thickness of an ice-sheet, was probably "not less than the 800 to 1,000 feet, and may have been much more."

I may here mention in passing that it is not only in Europe that this difference of opinion as to the explanation of glacial phenomena exists. In Canada our brother geologists also are divided into two camps, one upholding a great ice-sheet theory, and others believing in local glaciation and submergences as affording the true explanation. The great exponent of the more simple theory was the late Sir William Dawson, who had far more opportunities of studying the effects of ice-work in the great North American Continent than we are favoured with in the British Isles, and whose objections to the ice-sheet theory were substantially identical with those which I have endeavoured to lay before you.

At the top of page 74, the pieces of flint described by Dr. Colley March as coming from Ireland, I would submit are evidences of transport by floating ice rather than by glaciers, there being no sufficient land area in Ireland to produce ice-sheets of the enormous size demanded by the later theory, even were it possible for any known forces to have propelled such glaciers across the Irish Channel. Could our friends discover a glacier of half the dimensions they require traversing a sea-bed even 100 miles across and ascending mountains 1,000 feet high on the other side, our opposition to their views would be dismissed. But we maintain that such a feat has never been accomplished, and indeed is

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* Murray, Reports of Challenger Expedition.
See also Sir W. Dawson's "Great Ice Age" in "Salient Points in the Science of the Earth."

† New Series, vii. 6.

impossible of accomplishment, unless the present physical properties of frozen water were entirely different from what we know them to be. The insuperable difficulties of this theory have been pointed out by many writers, but I may refer to Professor Bonney's "Ice-Work" as giving a moderate resumé of the arguments on both sides.

On page 75 a valuable series of observations as to various beds of gravels, sands, and clays have been collated, many of which undoubtedly afford evidences of ice-action, and many also of aqueous agencies acting with considerable force in washing out, distributing, sorting, and sometimes stratifying the various debris which had been left on land surfaces from sub-aerial denudation or deposited upon them during submergence by floating ice. Some of these deposits must have been formed by the action of icebergs, or of shore ice, as the floating masses grounded and tore their way over the surfaces of the rising land or of shallows on what are now the hill-tops. A large iceberg grounding against the slope of a hill can deposit an immense amount of debris as it slowly melts, much of which may have been brought from its place of origin, whether in Scandinavia or Ireland, and the rest may have been dragged up from the land surface near which it finally came to rest. In this way local deposits, of small size, may be accounted for in the absence of glaciers; also the existence of boulders and masses of frozen gravel driven into previously existing deposits, as have been observed at Wokingham, Berks, and elsewhere, will find a similar explanation.

We now approach—with what courage we can—the plateau gravels of the Bagshot Sands, and here we are on more familiar ground. Do these exhibit any signs of ice-action? The distinction between plateau gravels and river or valley gravels is always recognised, but there can, I think, be no doubt that the plateau gravels are of different ages, as is recognised in the paper before us. It will be best to confine any remarks to the plateau gravel of the Bournemouth area, which caps our cliffs and extends for some miles inland, until interrupted by the valleys of the Stour to the north and of Poole harbour to the west. The leading features of this deposit, as I have observed them during some years' study, are as follows:—

(1) Our local plateau gravel occurs on high ground only, spread out in sheets of varying thickness from 2 to 10 or 12 feet.

(2) It consists almost wholly of sub-angular flints, some of which have been fractured and splintered before having been subjected to the action of moving water, which has partially rounded their sharper angles. Small splinters are rarely found to the east, but appear more frequently on the western side of our cliffs. Chert and small black pebbles are occasionally found. These flints are not battered, as they would have been if deposited on a sea shore.

(3) There are occasional traces of stratification, and current bedding is very evident in places.

(4) Palæolithic implements are occasionally found sparsely scattered amongst the flints, at all depths, and never in groups.

(5) I have never detected any scratches that could with certainty be attributed to ice-action.

To the west of Bournemouth pier this gravel lies on the Middle or Estuarine portion of the Bagshot Beds—according to Starkie Gardner's classification. East of the pier it lies on the Boscombe Sands, which form the lowest beds of the Bracklesham Series. West of Boscombe the gravel lies on the pebble and shingle beds of the Bracklesham, which consist of beds of well rounded flints that have been battered and originally formed part of the old sea-shore near what in Eocene times formed the mouth of the great river which laid down in succession the various Eocene beds of the Hampshire basin. The differences between these two gravels are very marked, and it is usually possible to tell from which of them any individual flint has been derived.

That these plateau gravels have not been deposited by ice-action is obvious from their position, their occurrence in sheets, their current bedding, and the regular dispersal of palæolithic implements amongst them. Neither can they have been deposited by rivers, which can hardly have flowed over such large areas on the tops of plateau land. It seems equally impossible that they could have existed in their present position during the glacial period. If so, they must have been broken up and distorted, if not entirely swept away, by the denuding forces then at work. We seem to be driven to the opinion they were deposited by torrents of flowing water, which must have swept them together, collected and deposited them in sheets, leaving them in their present position. It has been suggested that these floods may have resulted from melting ice at the close of the glacial period, but I think it more probable that this occurred during the rising of the land after the last great submergence which closed the palæolithic period.* This submergence is in accordance with the views of the late Sir Joseph Prestwich in his book "On Certain Phenomena belonging to the Close of the Last Geological Period," according to whom the raised beaches with their "heads," and the osseous fissures at Plymouth and elsewhere, are relics of the same general submergence, the last of the many to which our land has been subjected in geological times. These raised beaches are found at Portland, Torquay, Weston-super-Mare, and many other points, as well as at Gower, as referred to on page 74 of Dr. Colley March's paper. According to Sir Joseph Prestwich's opinion, the deposits resting upon the head at Gower would not therefore be of glacial age.†

There can be no reason, however, why signs of glacial action should not be found upon the flints of the plateau gravel, nor why

* For the effect of such submergence in Northern Europe, see the Rev. A. Irving's Paper in Q.J.G. Soc., xxxix., p. 77.

† The Tradition of the Flood, p. 84.

any foreign stones occurring here or in other patches of gravel should not have been transported by floating ice to the district where they were subsequently laid down in beds or patches. To these causes we may attribute the occurrence of such specimens as Dr. Colley March has exhibited, provided their ice-workmanship be admitted. Specimens of these are shown in Plate IV.

We next turn to the Sarsen stones, and enquire whether they afford any evidence of ice-action. The origin of Sarsen stones is well known geologically. They are fragments of quartz sandstone and quartzite conglomerate, of various degrees of hardness and size, composed of grains varying in size from a fine sand to a pea-stone, cemented by silica or sometimes with traces of iron oxide.* Sheets of similar material occur in occasional layers in Tertiary strata, but chiefly in the Bagshot sands between the beds of clay, sand and gravel. The formation of Sarsen stones can be examined *in situ* near the bottom of Durley Chine, where a flat mass of quartzite sandstone is now breaking up into fragments as the underlying clay and sand is washed away. In districts whence the Tertiary strata have been denuded, after washing away the softer beds, these flat masses of hard stone remained on the surface, being quickly broken up into boulders of various sizes, partly by gravity from their own weight—they being seldom more than one to two feet in thickness—and also by the action of frost. Such stones remain dotted over many Dorsetshire hills and heaths, where they are known as "grey wethers." In cultivated lands they have long been removed and broken up. Most of the stone circles and dolmens in Dorset, as well as part of Stonehenge, are built of these stones, which were far commoner in prehistoric times than now, and were found ready to hand by Celtic and pre-Celtic workmen. Some of these stones, by the well-known tendency of large boulders to "creep," have found their way down hillsides to valley bottoms and stream beds. Examples of the latter may be found at Wimborne at the bridge near the centre of the town, others are found by the stream at Nunney Castle, near Frome, whilst a curiously shaped one was recently found by Mr. Chambers, of Pokesdown, in a similar situation. In all these places Tertiary beds have been denuded, and there seems no need to call in other causes to account for the source and presence of Sarsens. These statements are confirmed by the writings of Mr. Clement Reid, Mr. Whitaker, and also Mr. Monkton, though the latter says that he has never seen them as originally found in Bagshot strata.† I should like him to examine the section referred to in Durley Chine. They are always more or less water worn when found in valleys, and those on hill-sides have been affected by the usual sub-aerial denuding forces.

Lastly, Sarsens are occasionally found embedded in plateau gravel. A notable instance of this is the stone discovered last summer in Upper Parkstone, of which some photographs I took

* Sarsens sometimes occur of a conglomerate nature, containing large flints, usually sub-angular, as about Portesham and in the Valley of Stones, in Dorset.

† See paper on "Gravels of the Bagshot District," in Q.J.G. Soc., liv., and the discussion following.

were shown at our last meeting. This stone must evidently have been deposited where found by the same forces and at the same time as the gravel, and the explanation I have given as to the deposition of the plateau gravel would equally apply to such stones as may be found in it. No very violent force of water would be required to move and transport such a stone as this, and the torrential floods that swept over the district at the last submergence of Dorsetshire would have carried about and shifted Sarsen stones as well as gravel. With regard to the power of currents to move boulders, I may refer to the remarkable experiments recorded in Prestwich's Geology,* by which it was proved that a current of water moving at 10 miles per hour could transport spherical blocks of stone weighing five tons, a current of 15 miles per hour could move blocks of 50 tons, and a current of 20 miles per hour blocks of no less than 320 tons; it being found that the weight of stone movable increased as the sixth power of the rate of the water current. This fact, actually proved by experiment and mathematical deduction, has not, I think, received the attention it deserves by geologists in their attempts to explain the transport of boulders.

So far, then, as evidence as to ice-action in Dorset can be expected from a study of Sarsens, I fear that we shall not derive much help. That these stones dotted the surface of the land during the glacial period, far more abundantly than now, cannot be doubted. That they may have been caught up, transported, and perhaps broken by floating ice floes and icebergs during partial submergence is highly probable. But the only evidence of this, except in the case of those found where no Tertiary beds formerly existed, would be in striæ or ice-markings on their surface, and such markings, so far as my observation goes, are conspicuous by their absence. The presence of these Sarsens is, however, an unexplained difficulty in the face of the ice-sheet theory, by which—had it ever existed in the county—all such stones must have been carried off the land surface and deposited beyond the Dorset coast line.

The stones of Stonehenge will probably always remain a mystery, for the place of origin of many of the megaliths is still contested by geologists. But there seems no reason to doubt the probability of Professor Judd's supposition, that the foreign stones had been carried there by ice, and so were found ready to hand by the builders. This, however, could only be so if they were transported by floating icebergs, which may have found a favourable site for grounding and depositing their debris on the high table-land of Salisbury Plain. Had an ice-sheet swept over the surface, the presence of the Sarsens at least becomes impossible; they must have been swept clear away from all table-land, as has been observed by Mr. Wright in Southern Greenland and Labrador.† Altogether, Professor Judd's suggestion affords a more reasonable explanation than the fantastic theory which imagined the transport of these blocks from various parts of England to Salisbury Plain by bands of enthusiastic idolators, who, passing by other suitable

* Vol. i., p. 84.

† Quoted by Dr. Colley March, p. 81, from *Glacial Magazine*, ii., 142.

material, must have traversed hundreds of miles to procure with infinite labour foreign stones of enormous size and of no greater virtue than those they found ready to hand. That these stones were found *in situ* is a far more probable story, and compares favourably with Mr. Clement Reid's idea of a supposed erratic-strewn plain now sunk beneath the sea (page 80).

Passing by a series of observations presented to us on pages 81 and 82 of facts bearing on possible glacial action in several districts, including Dr. Colley March's interesting reference to his finds in the Scilly Islands, all of which afford—I submit—evidence of the action of floating ice, and not of an ice-sheet, we return to Dorsetshire and visit Corfe Castle, on pages 83 and 84. It is of course possible that during glacial times, ice may have caused the blocking of one of the two streams which carved out the double valley; but there is surely a simpler explanation for this historic gap? I would suggest that the primary cutting down of the summit of the anticlinal by the combined streams had been gradually widened by the water passage, aided by sub-aerial denudation of the chalk sides, so that presently there was insufficient water to fill it, and the two brooks began each to plough up a channel for itself, one at the west and the other at the east side of the cutting. The middle area would then become first an island, and then gradually form the summit of the Corfe monticle, as each stream gradually carved out and cut down its own side of the hill. This theory is merely suggested to supplement the late Mr. Huddleston's view—which certainly seems the simplest of those offered us—and to avoid the necessity of presuming ice-action where other causes suffice.

It seems rather unnecessary to invent a glacier to account for Chesil Beach. Where are the mountains to supply such a glacier? Even in the glacial period glaciers could hardly have marched about the country like lions seeking what they might devour. I thought it was acknowledged that the bed of Kimmeridge clay, upon which the beach rests, was in its normal geological position, conformable and continuous with the adjacent bed of the Dorset coast; also that the clay had been cut down by marine erosion to that point at which, covered by the shingle, it has since been protected from wave action. The occurrence of the Fleet behind the beach is certainly more difficult of explanation, if, as Dr. Colley March assures us, it could not have been scoured out by water current. Writing on this, Mr. Strahan says: "That the Fleet is the result of sub-aerial denudation, as claimed by Messrs. Bristow and Whitaker, seems scarcely to admit of doubt."* Had the clay bed of the beach been due to ice-action, is it probable that a glacier of this power could have left no traces in its course on shore beyond the striated gravel near Chickerel? The subject is a difficult one, but perhaps further researches may throw fresh light upon it.

The discovery of a supposed moraine at Chesilton is very interesting. Certainly the specimens showed us last month may well have been brought by ice. Not having visited the spot, one is not qualified to discuss it. I would only suggest that the material

* Memoirs of the Geological Survey, Isle of Purbeck, p. 206.

may have been transported by ice-floes, in the absence of high ground from which a local glacier could have descended.

And now, in conclusion, I will revert for a moment to the views of the late Sir Joseph Prestwich in his "Geology"* on the Scandinavian ice-sheet theory, who sums up his account of the glacial period in these words: "The phenomena as a whole go to show that the glaciation of Great Britain was not due to a great Polar ice-cap, but was of local and independent origin." After the first glaciation, he agrees with Mr. Geikie in believing that "a great depression ensued by which Central England, Wales, and Ireland were submerged to the extent of 1,500 to 2,000 feet." Prestwich further adds that he disagrees with the view that the presence of boulder clay containing blocks of Scandinavian rocks, or of striations on rock surfaces in Germany or Norfolk, indicates that the ice-sheet extended there, but that the striations were due to local causes, and the boulders may have been caused by floating ice. Scandinavia was also submerged about 1,000 feet beneath the present sea-level, sea shells being found at heights from 200 to 600 feet up.

I do not pretend that the submergence and floating ice theory. which I have championed in this paper, presents no difficulties, On the contrary, both theories bristle with knotty points, but it seems that they are far more easily solved by the views here advanced than by those who can believe in glaciers, thousands of feet thick, plowing up the ocean bed and depositing fragile shells on mountain tops. A very impartial sketch of the position, giving the views of both parties, and the difficulties and objections advanced by each, will be found in Professor Bonney's "Ice-work in Great Britain,†" to which I have already referred.

To what conclusion can one come, then, as to the probable condition of Dorset during the glacial period? A reasonable correlation of the facts I have brought forward, supplemented by the valuable observations of Dr. Colley March and some of those he has quoted, will suggest this: that during submergence, floating icebergs and floe ice may have deposited erratics and foreign material, boulder clay, morainic matter, etc., frozen to their bases, in various parts, and possibly where they stranded they may have torn up the soil and scored the tops of hills, but that few of these signs of ice-action have escaped erasion by subsequent denudation —hence the paucity of the evidence now available. That also during the greater part of the glacial period, when Dorset was dry land, it was not covered by any great ice-sheet, but was probably only moderately snow clad, with deeper snow and ice on the hill-tops, forming perhaps in the valleys miniature local glaciers. But from the absence of high collecting ground of sufficient area to supply any great quantity of ice, as well as the comparative shallowness of our valleys, it seems unlikely that such glaciers could have had power to collect or transport much morainic material, even were the temperature as low as in Greenland to-day.

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* Vol. II., p. 453.
† P. 163—200.

Hence but little evidence of their existence is likely to remain. Dr. Colley March is to be congratulated on what he has discovered, but the fact of so industrious and acute an observer having during several years' search had no greater success, is evidence of the paucity of the remains of ice-work in the county.

We cannot, I think, do better than re-echo the words of Mr. Horace Woodward, after he had inspected the evidence Dr. Colley March has so kindly presented to us, and say: "The facts you have gathered with regard to the drift phenomena in South Dorset are most interesting, and we are convinced that you have good evidence of the action of local snow and ice and the slipping and melting of masses of snow and ice and incorporated material." But may I also add that we are still unconvinced that our country was ever invaded by a vast Scandinavian ice-sheet, that we object to foreign-made goods, and prefer to still believe that our glacial ice was made in England?

Notes on Eumichtis (Hadena) adusta Esp. var. pavida=chardinyi.

By W. Parkinson Curtis, Esq., F.E.S.

Boisduval in 1829 published "Europæorum Lepidopterorum Index Methodicus Pars primer (1829)." He subsequently in 1840 published "Genera et Index methodicus Europæorum Lepidopterorum (1840)." In this work he says at page 140:—

Hadena.			
943v	{	Pavida	Russia
	{	chardinyi Dup. suppl.	

Now he had in 1829 described an insect as Anarta chardinyi, *see B. Ind.*, p. 94 (1829), which was a totally distinct insect, and he subsequently changed the name to Triphæna chardinyi (*Icones*, vol. II, pl. 84, fig. 1).

Apparently Boisduval considered chardinyi Dup. as præoccupied with chardinyi Bdv., but since the insects belong to totally distinct genera and moreover chardinyi Dup. is a var. of Eumichtis adusta Esp., Boisduval is wrong. He gives no description whatever, and contents himself with sinking chardinyi Dup. as synonymic.

Duponchel in vol. III, supplement to "Godart Lep. ou Pap. Fr." (being a supplement to vols. IV, et seq. of that work), describes

chardinyi as follows—French original description with English translation of description following :—

HADENE DE CHARDINY.

Hadena de chardinyi, Nobis (pl. 21, fig. 4).
Envergure. 19 lignes.

Le dessus des premières ailes est d'un brun-violâtre, avec des eclaircies ferruginueses au centre. Chacune d'elles est traversée par trois lignes, dont deux grises et une blanche ; la première, en venant de la base, est ondulée et ordée de noir extérieurement ; la seconde, également bordée de noir, mais intérieurement, est sinueuse et dentée en scie, avec un point blanc au bout de chaque dent ; la troisème est anguleuse et forme un M bien prononcé au milieu de sa longueur. Contre cette dernière ligne s'appuie, du côté interne une rangée de taches noire sagittées. On voit en outre les rudiments d'une quatrième ligne près de la base. Les deux taches ordinaires, placée comme de coutume dans l'intervalle qui sépare les deux premières lignes, sont d'un gris-blanchâtre et finement cernées de noir. La réniforme est regulière ; l'orbiculaire est informe et s'etend jusqu'a la côte, dont l'extrémité est marquée de trois point blancs. Sous la tache orbiculaire on voit un trait noir en forme d'U couché. La frange, de la couleur du fond, est ponctuée de blanc et séparée du bord terminal par un liséré de la même couleur, précédé d'une série de petites lunules noires.

Les secondes ailes sont en-dessus d'un blanc-roussâtre, avec leur marge largement cernée de noirâtre, les nervures et un point central gris, la frange blanchâtre précédé d'un liséré d'un brun-noir, et partagée dans sa longueur par une ligne ondulée de la même couleur.

Le dessous des quatre ailes est d'un gris brun sans aucun caractère prononcé. La tête et le corselet sont d'un brun violâtre parséme de quelques poils gris. L'abdomen participe de la couleur des ailes inférieures, avec son extrémité plus foncée. Les antennes sont brunes.

Cette description ne concerne que le male ; la femelle nous est inconnue

Cette espèce a quelques rapports avec l'Adusta, mais en est très-distincte. N'ayant pu la reconnâitre dans aucun auteur, nous l'avons dédiée à M. Chardiny, qui a bien voulu nous la communiquer.

HADENA CHARDINYI Nobis (Pl. 20, fig 4).

The upper side of the forewings is a purplish brown, with some ferruginous suffusions in the middle. Each of them is traversed by three lines, of which two are grey and one white, the first starting from the base, is undulated and bordered exteriorly with black, the second also bordered with black but internally, is sinuous and toothed like a saw, with a white mark at the base of each dentation ; the third is angulated and formed a well marked M about the middle of the length. Against this last line there is, on the inner side a row of black arrow-shaped spots. One sees besides the rudiments of a fourth line near the base. The two ordinary marks, placed as is usual in the space between the first two lines, are of a whitish grey and narrowly circled with black. The reniform is regular, the orbicular is irregular and extends to the costa, which is marked at the extremity with three white spots. Under the orbicular spot one sees a black mark in the shape of a horizontal U. The fringe is the same colour as the ground, is chequered with white and separated from the termen by a line of the same colour preceded by a series of small black lunules. The hindwings are, above of a rosy white with their margin broadly suffused with blackish, the nervures and a central spot, grey, the fringe whitish preceded by a streak of brownish black and divided throughout its length by an undulating line of the same colour.

The underside of the forewings is a grey brown, without any pronounced character.

The head and the thorax are a purplish brown interspersed with some grey hairs. The abdomen partakes of the colour of the inferior wings with its extremity darker. The antennæ are brown.

This description applies only to the male; the female is unknown to us. This species is in some respects like adusta, but is very distinct from it. Not having been able to recognise it in any other author, we have dedicated it to M. Chardinyi, who had the kindness to communicate it to us.

Duponchel's figure at XXI, fig. 2, has been drawn as spotted with white. Apparently age has caused the white to turn grey, as it often does where lead is present in the white.

Herrick-Schäffer says of this figure that it is unrecognisable, *vide* extract herewith.

Extract from the "Systematische Bearbeitung der Schmetterlinger von Europa" of Dr. G. A. W. Herrich-Schäfer, p. 80 (1845):—

HADENA.

306 Pavida Boisd.—Suppl. 497—chardinyi, Dup. pl. 21, 4, unkenntlich —18—19 L.

Fusca, cinereo-& purpurascenti-mixta, linea undulata acute nivea. Ein weibliches Examplar, welches Herr Chardiny aus Russland brachte; von Herrn Donzel mitgelheilt. Ich beweisle den specisischen Unterschied von Adusta, weil nur die Farben abweichen. Es findet sich namlich keine rostgelbe, sondern nur purpurbraune Einmischung, die Querstreifen die Makeln sind weissgrau aufgeblickt, die Wellenlinie fast schneeweiss, eben so die Punkte hinter dem hinteren Querstreif. Die Hinterflugel sind weisser als sogar beim Manne von adusta, und so wie bei diesem rauchbraun bezeichnet.

English translation of above:—

Pavida Boisd.—Suppl. 497—chardinyi, Dup. pl. 21, 4, unrecognisable —18—19 L.

Fuscous, grey and purplish mixed, undulated line brilliantly snow white. A female example which Herr Chardiny brought from Russia was communicated to Herr Donzel. I doubt the specific distinction from adusta, because only the colour differs. One finds indeed no rust yellow, but only purple brown suffusion, the fasciæ and the spots are shining whitish grey, the discal line, bright snow white, as also the spots within the submarginal line. The hind wings are whiter than even those of adusta thus rendering the smoke brown on them distinct.

There can be no doubt that chardinyi Dup. and pavida Bdv. and H.S. are synonymous. Staudinger in his Cat. Lep. Pal., p. 171, and Kirby Eur. Butt. and Moths, p. 238 (1903) gave preference to the name pavida, which is clearly wrong. Moreover Kirby says of pavida, "much darker, nearly unicolorous." Duponchel's figure shows distinct variation and Staudinger says variegated with white. Duponchel and Herrick-Schäffer both call attention to the white variegation of the form. Hamp. Noc. Phalænæ, vol. VI, p. 330, sinks pavida, as a synonym and in this I concur.

Full synonymy is therefore:—

chardinyi	Dup. Lep. Fr. Suppl. III, pl. 21, fig. 4 (1836).
ib.	Hamp. Cat. Noct. Phal. VI, p. 330 (1st Nov., 1906).

pavida	Boisduval. Gen. et Ind. Meth., p. 120 (1840).
ib.	Herr-Schäff. Eur. Schmett. II, p. 280. Noct. 497 (1845).
ib.	Strg. and Reb., Cat. Pal. Lep., p. 171, No. 1665b (1901).
ib.	Kirby. Eur. Butt. and Moths, p. 238 (1903).

Forewings darker purplish variegated with white. Staudinger suggests that possibly chardinyi Dup. is a distinct species from adusta Esp.

I have two specimens from the Kieff Government, Russia, which correspond to this variety.

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